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AN EVALUATION OF SEVERAL CHEMICALS FOR THEIR HERBICIDAL PROPERTIES
1960 Field Results

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Preliminary Data Not For Publication

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Growth Through Agricultural Progress

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2-methoxy-3,5,6-trichlorophenylacetic acid	-	VEL	17, 34, 35, 36
trichloro-2,4-dimethylphenylacetic acid	-	HCC	18, 34, 35, 36
2-chloro-4,6-bis(ethylamino)-s-triazine	simazine	GCC 6/	19, 34, 35, 36, 37, 40
2-chloro-4-ethylamino-6-isopropylamino-s-triazine	atrazine	GCC	20, 34, 35, 36, 37
2-methoxy-4,6-bis(3-methoxypropylamino)-s-triazine	-	GCC	40

Chemical *	Designation	Source **	Table numbers ***
2-methylthio-4,6-bis(3-methoxypropylamino)-s-triazine	-	MCC 11/	21, 34, 35, 36
isopropyl N-(3-chlorophenyl)carbamate	CIPC	CSC 2/	22, 34, 35, 36, 37, 42
ethyl N,N-di-n-propylthiolcarbamate	EPTC	STF 16/	23, 34, 35, 36, 37
2-chloroallyl dipropyldithiocarbamate	-	MCC	24, 34, 35, 36
3-(3,4-dichlorophenyl)-1,1-dimethylurea	diuron	EID	25, 34, 35, 36
2,3,5,6-tetrachloroterephthalic acid, dimethyl ester	-	DAC 3/	26, 34, 35, 36
O-(2,4-dichlorophenyl) O-methyl isopropylphosphoramidothioate	-	DCC 4/	27, 34, 35, 36
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2,4-dichlorophenoxyacetic acid, alkanolamine salts	2,4-D	DCC	33, 34, 35, 36, 37

* Nomenclature based on Weed Society of America Terminology Committee Report.

** Source

Abbr.	Source of Chemicals	Contact
1/ ACP	Amchem Products, Inc., Ambler, Pa.	R. H. Beatty
2/ CSC	Columbia Southern Chem. Corp., Pittsburgh, Pa.	W. C. McConnell
3/ DAC	Diamond Alkali Corp., Cleveland, Ohio	L. G. Utter
4/ DCC	Dow Chemical Co., Midland, Mich.	L. Southwick
5/ EID	E. I. duPont deNemours Co., Wilmington, Del.	R. Varner
6/ GCC	Geigy Chemical Corp., Yonkers, N. Y.	C. E. Bartley
7/ HCC	Heyden Newport Chem. Corp., Garfield, N. J.	R. H. Barth
8/ HDY	Houdry Process Corp., Marcus Hook, Pa.	J. H. Krause
9/ INC	International Nickel Co., New York, N. Y.	C. A. Hochwalt
10/ KCC	Kolker Chemical Corp., Newark, N. J.	J. G. Brunton
11/ MCC	Monsanto Chemical Co., St. Louis, Mo.	L. H. Hannah
12/ MDU	Maryland University, College Park, Md.	E. W. Reeve
13/ NFM	Niagara Chemical Div., Food Machinery & Chemical Corp., Middleport, N. Y.	B. C. Dickinson
14/ NUS	Naugatuck Chem. Div., U. S. Rubber Co., Bethany 15, Conn.	J. A. Riddell
15/ SHC	Shell Development Co., Modesto, Calif.	E. F. Feichtmeir
16/ STF	Stauffer Chemical Co., New York, N. Y.	A. B. Lindquist
17/ VEL	Velsicol Chemical Corp., Chicago, Ill.	L. L. Stitt

*** Table numbers - Single Rate Plots, 1-33; Summary, 34-37; Logarithmic Plots, 38-42.

AN EVALUATION OF SEVERAL CHEMICALS FOR THEIR HERBICIDAL PROPERTIES

1960 Field Results

W. A. Gentner and L. L. Danielson [1/]

The results of the 1960 preliminary field evaluation studies of several chemicals for their herbicidal properties are presented in this report. These studies were conducted by personnel of the Weed Investigations - Horticultural Crops group, Crops Protection Research Branch, Crops Research Division, at the Plant Industry Station, Beltsville, Maryland.

The objectives of the herbicide evaluation project are (1) to develop herbicide evaluation techniques, (2) to determine the responses of crops and weeds to new chemicals applied as soil-incorporated pre-planting, pre-emergence and post-emergence treatments, (3) to obtain preliminary information on the herbicidal properties of new chemicals, (4) to study the relationships between chemical structure and herbicidal activity, and (5) to make this information available to Department of Agriculture personnel and cooperating state and chemical industry weed research workers.

These field evaluation studies should be interpreted as preliminary and the results analyzed and used accordingly.

MATERIALS AND METHODS

A three year field rotation was put into effect in the experimental areas used for these studies in the spring of 1959 in order to insure uniform weed populations and to reduce the possibility of confounding results due to residual activity of chemicals in the soil. The areas used for the 1960 field studies were planted to corn in the summer of 1959 and a cover crop mixture of rye and vetch during the fall-spring periods of 1959-1960.

It was felt from previous experience that much could be gained through pre-planting soil-incorporated, pre-emergence and post-emergence applications of new chemicals using the logarithmic sprayer. Hence, a number of chemicals were applied to selected crops and weeds in preliminary evaluation studies in this manner.

There is a critical need for data reflecting the properties of herbicides on granular carriers. Eight herbicides were evaluated as spray and granular formulations in single rate experiments.

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Seedbeds were prepared on an Elkton silt loam by plowing to a depth of 8-10 inches and harrowing with a spike-tooth harrow. Approximately 400 pounds of a 5-10-5 fertilizer per acre were applied just prior to plowing.

Single Rate Plots

Twenty-four crop and five weed species were seeded in the area on which a conventional tractor-mounted experimental plot sprayer was employed. Each large-seeded crop was planted with a tractor-drawn gang-planter at the recommended rate and depth of seeding in four rows spaced 20 inches apart. Several small seeded crops and weeds including alfalfa, birdsfoot trefoil, red clover, white clover, crabgrass, ryegrass, lambsquarters, mustard, and pigweed were broadcast seeded in about 10 foot swaths on the experimental area over compatible crops. Small-seeded crops and weeds were covered by means of a plank-drag. The term grasses in tables 1-33 refers collectively to foxtail species (Setaria spp.), barnyardgrass (Echinochloa crusgalli), and goosegrass (Eleusine indica). The term broadleaved weeds in these tables refers to ragweed (Ambrosia artemisiifolia), smartweed (Polygonum pennsylvanicum), carpetweed (Mollugo verticillata), morningglory (Ipomea purpurea), dogbane (Apocynum cannabinum), horsenettle (Solanum carolinense), and velvet leaf (Abutilon theophrasti).

The crop plants, weed species, chemical, chemical rates per acre, and time of treatment are indicated in tables 1-33 for those plots treated using conventional single-rate spray techniques.

The pre-planting soil-incorporated treatments were applied and disked into the soil on May 18. Test species were planted 7, 14, and 28 days after treatment. The crop and weed stand was too erratic to evaluate for the first two planting dates and only the responses of test species planted 28 days after treatment are included in this report. Data were recorded on July 7, 1960.

The pre-emergence treatments were applied on May 18, the day after planting. Data were recorded June 13, 1960.

The test species used in the post-emergence plots were planted on May 17, treated on June 17, and data were recorded July 11, 1960.

A list of the common and binomial names, varieties, and height of the species at time of post-emergence treatments is given on page 17.

All chemicals were formulated in either acetone (A), water (W), or on a 15-30 AA RVM attapulgite [Attaclay] (G). Spray formulations contained a 1 percent v/v concentration of the surfactant polyoxyethylene sorbitan monolaurate and were delivered in a volume of 40 gallons per acre. Granular treatments were applied with an experimental distributor. The herbicides were applied on 37-1/2 pounds of the granular per acre. A canvas drag was used to dislodge the granules from the foliage after post-emergence treatments.

All rates of application are given on an acid equivalent basis where applicable. Other rates are given on an active ingredient basis.

Data presented in tables 1-33 represent a combination of the average of three independent injury ratings using the following scale: 0 = no visible effect; 1,2,3 = slight injury, plants usually recovered with little or no reduction in top growth; 4,5,6 = moderate injury, plants usually recovered but with reduced top growth; 7,8,9 = severe injury, plants usually did not recover; 10 = all plants killed; and the average of three independent ratings on the percentage reduction in stand. The numerical value derived from the combination of these criteria makes it possible to use a single herbicide activity index value to show the effect of each chemical rate on each test species. The range of the herbicide activity index value is from 0 to 100. A herbicide activity index value of 0 indicates that the chemical has no effect on the species, while a value of 100 indicates complete kill. The herbicide activity index value is derived as follows:

$$\frac{(\text{Injury rating score} \times 10) + \text{pct red in stand}}{2} = \text{herbicide activity index value}$$

In preparation of the summary tables several arbitrary figures were chosen. An activity index of 30 or less on crops was considered as sufficient tolerance to warrant further evaluation if weed control was achieved. An activity index of 70 or more on weeds was considered as satisfactory weed control. A desirable situation may be described as a chemical, the applications of which brought about an activity index of 30 or less on specific crops and an activity index of 70 or more on weeds.

Logarithmic Plots

The area used for the preliminary evaluation of chemicals applied with the logarithmic sprayer was marked into a series of 4 x 60 ft beds. Each treatment type consisted of 3 beds with 4 rows of crops 9 inches apart per bed and was overseeded to ryegrass, lambsquarters, pigweed, and mustard. Purslane was a natural weed common to all plots. All crops were seeded at the recommended depth with a tractor-mounted gang-planter. High seeding rates were used to provide a large population of plants for evaluation at the various rate levels.

Two rows of the crops listed in tables 38 through 42 for the pre- and post-emergence treatments were planted in each plot on May 19. Weeds were overseeded on the plots and covered by means of a plank-drag.

Pre-planting soil-incorporated treatments and pre-emergence treatments were applied on May 17. Pre-planting treatments were immediately disked into the soil to a depth of 4 inches. One bed was disked again and planted to one row each of the four crops listed on tables 38-42 and overseeded with the weed mixture listed above at 7, 14, and 28 days after treatment and incorporation, respectively. Post-emergence applications were made on June 20, when the soybeans were 5 inches tall and in the first trifoliate-leaf stage.

Pre-planting soil-incorporated data were recorded 30 days after the three respective planting dates. Pre-emergence data were recorded June 16 and post-emergence data were recorded July 7, 1960.

An erratic stand of grassy and broadleaved weeds occurred in the preliminary logarithmic plots. For this reason it was found desirable to record data for broadleaved and grassy weeds collectively.

The rates of application of a compound on the logarithmic plots are presented as a rate-range and include an initial high level of application and all rates of application down to and including one-fourth of the high level.

The responses of the test species were determined on an absolute basis, i.e. the maximum rate of chemical application that was tolerated without visible injury to the crop was recorded. Conversely, for weeds, that rate of chemical application that resulted in complete control of the weed was recorded.

Rainfall and temperature prior to and after preliminary field evaluation studies.

Single Rate Plots

	Total rainfall	Min. av. temp.	Max. av. temp.
	inches	°F.	°F.
Chemicals applied pre-planting and pre-emergence, May 18, 1960			
30 days prior to treatment	3.22	44	73
7 days prior to treatment	.33	45	68
7 days after treatment	1.18	54	77
30 days after treatment	3.56	56	78
Chemicals applied post-emergence, June 17, 1960			
30 days prior to treatment	3.63	56	78
7 days prior to treatment	1.13	56	81
7 days after treatment	.07	58	80
30 days after treatment	3.18	59	84

Logarithmic Plots

	Total rainfall	Min. av. temp.	Max. av. temp.
	inches	°F.	°F.
Chemicals applied pre-emergence, May 19, 1960			
30 days prior to treatment	3.12	44	72
7 days prior to treatment	.43	46	69
7 days after treatment	1.18	54	77
30 days after treatment	3.56	56	79
Chemicals applied post-emergence, June 20, 1960			
30 days prior to treatment	3.56	56	79
7 days prior to treatment	1.13	60	83
7 days after treatment	.49	58	82
30 days after treatment	3.18	59	84

RESULTS AND DISCUSSION

The data reported herein are preliminary and are an expression of plant responses to chemicals applied as soil-incorporated pre-planting, pre-emergence, and post-emergence treatments under the environmental conditions of these experiments. These data are to be interpreted as indicative and not conclusive and are therefore presented as a guide in the use and development of the prospective herbicides listed.

Single Rate Plots

Data derived from the preliminary evaluation studies are presented as herbicide activity index values. The responses of the test species to each chemical are presented on a single page (Tables 1-33) in order to allow the ready comparison of crop and weed responses to pre- and post-emergence treatments. Such comparisons will allow the investigator to select chemicals for application following clean cultivation at lay-by. The response of the test species to each chemical are summarized in tables 34, 35, and 36 where reference is made to the individual tables from which the summary was drawn.

The herbicidal properties of compounds evaluated in 1960 will be discussed by method of treatment under the following crop groups:

(1) Small-Seeded Legume Crops: alfalfa, birdsfoot trefoil, lespedeza, red clover, white clover.
(2) Cereals and Forage Crops: buckwheat, corn, oats, sorghum, Sudangrass.
(3) Oilseed and Fiber Crops: castorbeans, cotton, flax, peanuts, safflower, soybeans.
(4) Root Crops: sugarbeets.
(5) Vegetable Crops: cabbage, cowpeas, cucumbers, lima beans, peas, snapbeans, squash.
(6) Soil Sterilants
(7) Structure and Activity
(8) Granular Formulations

Small-Seeded Legume Crops

The pre-emergence control of one or more grasses and broadleaved weeds was achieved by treatment with several of the carbamates (Summary Table 35). The post-emergence application of several chemicals was tolerated by various species of small-seeded legumes. Among these, only one carbamate, 2-chloroallyl dipropyldithiocarbamate, controlled broadleaved weeds and weed grasses. Other chemicals that gave post-emergence control of one or more weed grasses and broadleaved weeds were O-(2,4-dichlorophenyl) O-methyl isopropylphosphoramidothioate and the granular formulation of alkanolamine salts of 4,6-dinitro-o-sec-butylphenol [DNBP] (Summary Table 36).

Cereals and Forage Crops

A wide range of chemicals was effective in controlling weed grasses and broadleaved weeds in cereals and forage crops. This affords investigators a choice of treatment time and the possibility of employing chemical rotation as a means of controlling a broader spectrum of weeds.

Corn showed considerable tolerance to the pre-planting application of many of the substituted benzoic and phenylacetic acids as well as the s-triazines, ethyl N,N-di-n-propylthiolcarbamate [EPTC], and the alkanolamine salts of DNBP (Summary Table 34).

Pre-emergence treatments of the various salts of 2,3,6-trichlorobenzoic acid [2,3,6-TBA] and the dimethylamine salt of 5-amino-2,3,6-trichlorobenzoic acid appeared quite promising. Acceptable crop tolerance and weed control were also obtained with several of the phenylacetic acids, s-triazines, 3-(3,4-dichlorophenyl)-1,1-dimethylurea [diuron], dimethyl ester of 2,3,5,6-tetrachloroterephthalic acid and O-(2,4-dichlorophenyl) O-methyl isopropylphosphoramidothioate. Corn and oats were obviously more tolerant to the pre-emergence application of the substituted benzoic acids than were sorghum and Sudangrass (Summary Table 35).

Post-emergence treatments of a number of chemicals were effective in controlling broadleaved weeds and/or grasses in certain of the cereal and forage crops (Summary Table 36).

Oilseed and Fiber Crops

The compounds effective in controlling weeds in the pre-planting treatment of the oilseed and fiber crops were, by and large, active on either broadleaved or weed-grasses. EPTC was the only compound that gave satisfactory control of both weed-grasses and broadleaved weeds in the pre-planting treatments. Other compounds which appear promising are amino, nitro, methoxy, or methyl substituted benzoic or phenylacetic acids and carbamates (Summary Table 34).

A wide variety of compounds gave satisfactory control of broadleaved weeds and weed grasses in oilseed and fiber crops as pre-emergence sprays. Several substituted benzoic and phenylacetic acids, the carbamates, dimethyl ester of 2,3,5,6-tetrachloroterephthalic acid, O-(2,4-dichlorophenyl) O-methyl isopropylphosphoramidothioate, and 2-methylthio-4,6-bis(3-methoxypropylamino)-s-triazine should be further evaluated. The above mentioned s-triazine shows excellent promise for weed control in flax (Summary Table 35).

Post-emergence treatments of 2-methylthio-4,6-bis(3-methoxypropylamino) -s-triazine and granular 2-chloro-4-ethylamino-6-isopropylamino-s-triazine [atrazine] appear quite promising for weed control in flax as do 3-amino-2,5 -dichlorobenzoic acid [amiben] and 3-nitro-2,5-dichlorobenzoic acid. The carbamates, dimethyl ester of 2,3,5,6-tetrachloroterephthalic acid, and

O-(2,4-dichlorophenyl) O-methyl isopropylphosphoramidothioate offer a wide range of selectivity within the oilseed and fiber crops and are worthy of further evaluation for post-emergence weed control in these crops (Summary Table 36).

Root Crops

Several chemicals appear promising for control of either broadleaved weeds or weed grasses in sugar beets when applied as pre-planting treatments. EPTC was the only compound that gave satisfactory control of weed-grasses and broadleaved weeds as a pre-planting treatment. The dimethylamine salt of 5-nitro-2,3,6-trichlorobenzoic acid gave satisfactory control of broadleaved weeds and the 2-methoxy-3-methyl-5,6-dichlorobenzoic acid gave satisfactory control of weed-grasses in sugar beets as pre-planting treatments suggesting that further evaluations should include studies of these chemicals singly and in combination (Summary Table 34).

Pre-emergence treatments of EPTC gave satisfactory control of one or more weed-grasses and broadleaved weeds in sugar beets (Summary Table 35).

The post-emergence applications of several compounds gave satisfactory broadleaved weed control in sugar beets. These were isopropyl N-(3-chlorophenyl)carbamate [CIPC] and several naphthoquinones (Summary Table 36).

Vegetable Crops

Cabbage, the only vegetable crop included in the pre-planting phase of this experiment, tolerated pre-planting applications of 2-methoxy-3,5,6-trichlorophenylacetic acid and 5-nitro-2,3,6-trichlorobenzoic acid, the former giving weed-grass control and the latter broadleaved weed control (Summary Table 34).

A wide range of compounds applied as pre-emergence sprays gave satisfactory weed control in the vegetable crops. Several of the amino, nitro, methoxy or methyl substituted benzoic or phenylacetic acids as well as the carbamates, dimethyl ester of 2,3,5,6-tetrachloroterephthalic acid, and O-(2,4-dichlorophenyl) O-methyl isopropylphosphoramidothioate should be further evaluated as herbicides in vegetable crops (Summary Table 35).

Several of the chemicals applied as post-emergence treatments were tolerated by a number of vegetable crops as spray and/or granular formulations (Summary Table 36). Results obtained with pre-emergence treatments of certain of these chemicals were very effective in controlling weeds (Summary Table 35). This suggests further evaluation of these chemicals as treatments following clean cultivation at lay-by.

Soil Sterilants

Several compounds evaluated during the 1960 growing season possess sufficient general herbicidal activity to suggest their evaluation as soil sterilants.

These are 2-methoxy-3-methyl-5,6-dichlorobenzoic acid and 2-methylthio-4,6-bis(3-methoxypropylamino)-s-triazine (Summary Tables 35 and 36).

Structure and Activity

One of the objectives of the herbicide evaluation project is to determine the relation between chemical structure and herbicidal activity. Two such relationships are evident in the data presented in this report.

The positioning of the amino group in mono-amino dichloro substituted benzoic acids is of high significance. The 3-amino-2,5-dichlorobenzoic acid is highly selective in its herbicidal properties. However, the properties possessed by 2-amino-3,5-dichlorobenzoic acid cannot be considered herbicidal from a practical standpoint (Tables 1 and 3).

When polychlorobenzoic acid was compared to the iso-octyl ester of polychlorobenzoic acid on an acid equivalent basis, it was obvious that esterification of this molecule results in a significant decrease in its herbicidal activity (Tables 11 and 13).

Granular Formulations

Eight compounds of known herbicidal properties were formulated on a granular carrier. Granular and spray applications of these compounds were compared as pre-planting, pre-emergence, and post-emergence treatments. In general the pre-planting applications of spray and granular formulations were quite comparable in herbicidal activity and selectivity. However, the granular formulation of the alkanolamine salt of DNBP was slightly less active than the spray formulation.

The results of the pre-emergence applications of the spray and granular formulations were very similar. Differences between the spray and granular formulations are not considered significant.

When the herbicidal activity of the post-emergence spray formulation is compared to that of the post-emergence granular formulation, large differences in plant responses are often evident. A comparison of the pre- and post-emergence herbicidal activity of spray and granular formulations is presented in table 37.

Granular herbicides may be used as pre-planting, pre-emergence, or as post-emergence treatments. They are often used as overall or directed post-emergence treatments for the control of germinating weeds following clean cultivation at lay-by.

In order to visualize the usefulness of herbicides from the latter standpoint, one must look at the activity of the individual chemicals on crops when applied as post-emergence treatments and the response of weeds to the

pre-emergence application of the granular formulations. It is readily recognizable that the selectivity resulting from granular applications of herbicides is due to several factors. The physical, chemical, and herbicidal properties of compounds influence their activity as do the physical properties of the plants.

Logarithmic Plots

It was reported in 1959 that the logarithmic sprayer showed excellent potential for adaptation and use in preliminary evaluation studies. During the 1960 growing season 18 chemicals were evaluated for their herbicidal properties using the logarithmic sprayer in preliminary evaluations to determine the potentialities of this equipment for this purpose. The results of these studies are presented as a separate unit to demonstrate the implications of logarithmic rate-range applications. The rate range applied by the logarithmic sprayer, from an initial high rate to a low rate and all inclusive rates, lit literally graphs crop tolerance and weed susceptibility to the compound being evaluated. It is evident from the data presented that this method establishes crop tolerance and weed susceptibility quite clearly allowing the convenient selection of rates of application and shows the margins of tolerance for advanced yield and quality studies. The data derived from the preliminary logarithmic plots (Tables 38-42) are discussed by treatment and crop on the basis of to tolerance by the respective crop and absolute weed control. Examination of the individual tables will reveal that lay-by treatments following clean cultivation appear promising for several chemicals and crops.

Cabbage

The pre-emergence application of 2-methoxy-3,6-dichloro-5-nitrobenzoic acid gave control of broadleaved weeds.

Corn

Pre-planting treatments of amiben, fenac, and simazine gave good control of broadleaved weeds and weed grasses.

Pre-emergence treatments of 2,3,6-TBA, 2-methoxy-3,6-dichloro-5-nitrobenzoic acid, simazine and 2-methoxy-4,6-bis(3-methoxypropylamino)-s-triazine, DNBP and CIPC controlled either or both broadleaved weeds and weed grasses.

Post-emergence applications of 2-methoxy-3-methyl-6-chlorobenzoic acid and simazine gave control of broadleaved weeds.

Cotton

The pre-emergence application of 2-methoxy-3,6-dichloro-5-nitrobenzoic acid and 2-methoxy-4,6-bis(3-methoxypropylamino)-s-triazine controlled broadleaved weeds and/or grasses.

Peanuts

Pre-emergence applications of 2-methoxy-4,6-bis(3-methoxypropylamino)-s-triazine and CIPC gave control of broadleaved weeds and weed grasses. DNBP, however, only controlled broadleaved weeds.

The post-emergence application of DNBP controlled broadleaved weeds.

Soybeans

The pre-planting and pre-emergence applications of amiben gave control of broadleaved weeds and/or weed grasses. Its herbicidal effectiveness appears to quickly dissipate. Pre-emergence applications of 2-methoxy-4,6-bis(3-methoxy-isopropylamino)-s-triazine controlled broadleaved weeds and weed grasses.

Sugar beets

This crop did not tolerate the pre- or post-emergence application of any compound included in the primary logarithmic spray plots.

Residual Activity of Herbicides

The experimental areas used for the preliminary single rate and logarithmic plots were plowed to a depth of 8-10 inches on August 15. A seedbed was prepared by a thorough disking to a depth of 4-6 inches and a cover crop of rye and vetch was seeded on September 1. The experimental areas were evaluated on November 10 and there was no evidence of residual herbicidal activity.

SUMMARY

The responses of 24 test crops and 5 weeds to 35 chemicals applied in single rate plots as pre-planting soil-incorporated, pre-emergence and/or post-emergence treatments are recorded in tables 1-33 and are summarized in tables 34-36 by crops, weeds and chemicals. The herbicidal activities of eight chemicals were compared as spray and granular applications in the single rate plot experiment. These data are summarized in table 37.

In the single rate plot summary, an "X" indicates that a phytotoxicity index was 30 or less for crops and 70 or more for weeds. Reference is made in the summary table to the specific tables of individual data.

The logarithmic sprayer was used in the preliminary evaluation of eighteen chemicals applied as pre-planting soil-incorporated, pre-emergence and post-emergence treatments. Logarithmic plot data are presented in tables 38-42.

Species and Varietal Names of Crops and Weeds

	Common Name	Scientific Name	Variety	Height of test species in inches at time of post-emergence treatment
1.	Alfalfa	Medicago sativa	Atlantic	7
2.	Birdsfoot trefoil	Lotus corniculatus	Italian	3
3.	Buckwheat	Fagopyrum esculentum	---	21
4.	Cabbage	Brassica oleracea v. capitata	Late Flat Dutch	3
5.	Castorbeans	Ricinus communis	Cimarron	6
6.	Corn	Zea mays	US 13	11
7.	Cotton	Gossypium hirsutum	Coker 100 WR	4
8.	Cowpeas	Vigna sinensis	Mixed	5
9.	Cucumber	Cucumis sativus	Marketer	4
10.	Flax	Linium usitatissimum	Cascade	7
11.	Lespedeza	Lespedeza stipulaceae	Climax	2
12.	Lima beans	Phaseolus limensis	Beltsville 151	6
13.	Oats	Avena sativa	Clinton 59	13
14.	Peanuts	Arachis hypogae	Spanish	3
15.	Peas	Leguminosae sativum subsp. hortense	Laxton Progress	11
16.	Red clover	Trifolium pratense	Kenland	3
17.	Safflower	Carthamus tinctorius	Pacific 2	8
18.	Snapbeans	Phaseolus vulgaris	Black Valentine	7
19.	Sorghum	Sorghum vulgare	Amber	7
20.	Soybeans	Soja max	Clark	5
21.	Squash	Cucurbita pepo	E. S. Crookneck	10
22.	Sudan grass	Sorghum vulgare sudanese	Sweet 372	7
23.	Sugar beets	Beta vulgaris	SP 55600-01	4
24.	White clover	Trifolium repens ladino	Pilgrim	2
25.	Crabgrass	Digitaria sanguinalis	---	3
26.	Ryegrass	Lolium multiflorum	---	6
27.	Lambsquarters	Chenopodium album	---	5
28.	Mustard	Brassica kaber	---	10
29.	Pigweed	Amaranthus retroflexus	---	3

Table 1. Single Rate Plot Results, Tables 1-33.

Chemical	3-amino-2,5-dichlorobenzoic acid [amiben]					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	4A	8A	4A	8A	4A	8A
Crops [2]						
Alfalfa			100	100	40	60
B-ft trefoil			100	100	40	70
Buckwheat			60	90	80	90
Cabbage	20	60	80	95	10	50
Castorbeans			60	90	60	95
Corn	10	50	70	90	30	50
Cotton	30	80	70	90	100	100
Cowpeas			60	90	40	70
Cucumber			60	90	70	95
Flax			10	20	30	50
Lespedeza			100	100	90	95
Lima beans			10	60	50	80
Oats			60	80	40	60
Peanuts	20	50	40	70	60	80
Peas			10	20	30	50
Red clover			100	100	70	90
Safflower			40	60	40	60
Snapbeans			20	40	50	70
Sorghum			70	90	10	10
Soybeans	30	60	20	40	40	70
Squash			10	10	40	50
Sudan grass			60	80	10	10
Sugar beets	30	70	100	100	95	95
White clover			100	100	20	40
Crop Tox. Av.	23	62	59	75	48	66
Weeds						
Crabgrass			100	100	25	30
Ryegrass			70	90	10	20
Other grasses	20	50	90	95	30	40
Lambsquarters			100	100	70	90
Mustard			60	90	40	60
Pigweed			100	100	70	95
Other brdlf	20	40	90	95	30	50
Weed Tox. Av.	20	45	87	96	39	55
Total Tox. Av.	23	58	65	80	46	64

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 2.

Chemical	3-nitro-2,5-dichlorobenzoic acid					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	4A	8A	4A	8A	4A	8A
Crops [2]						
Alfalfa			100	100	30	60
B-ft trefoil			95	100	50	70
Buckwheat			80	90	50	70
Cabbage	60	90	60	90	40	60
Castorbeans			50	90	40	90
Corn	50	70	60	80	10	20
Cotton	50	80	80	95	95	100
Cowpeas			60	70	40	90
Cucumber			50	90	60	90
Flax			10	20	20	40
Lespedeza			100	100	90	95
Lima beans			20	40	30	50
Oats			60	60	20	40
Peanuts	30	50	30	60	20	30
Peas			10	20	50	80
Red clover			100	100	70	95
Safflower			30	50	10	20
Snapbeans			50	70	50	80
Sorghum			70	80	10	20
Soybeans	50	80	40	70	50	80
Squash			10	10	40	70
Sudan grass			60	60	10	30
Sugar beets	50	60	100	100	60	80
White clover			100	100	40	70
Crop Tox. Av.	48	72	59	73	41	64
Weeds						
Crabgrass			100	100	10	20
Ryegrass			60	90	10	10
Other grasses	30	70	90	95	10	20
Lambsquarters			100	100	50	70
Mustard			50	80	10	20
Pigweed			100	100	50	70
Other brdlf	20	60	90	95	30	50
Weed Tox. Av.	25	65	84	94	24	37
Total Tox. Av.	43	70	65	78	37	58

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 3.

Chemical	2-amino-3,5-dichlorobenzoic acid					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	4A	8A	4A	8A	4A	8A
Crops [2]						
Alfalfa B-ft trefoil Buckwheat Cabbage Castorbeans Corn Cotton Cowpeas Cucumber Flax Lespedeza Lima beans Oats Peanuts Peas Red clover Safflower Snapbeans Sorghum Soybeans Squash Sudan grass Sugar beets White clover	Relatively Inactive		Relatively Inactive		Relatively Inactive	
Crop Tox. Av.						
Weeds						
Crabgrass Ryegrass Other grasses Lambsquarters Mustard Pigweed Other brdlf	Relatively Inactive		Relatively Inactive		Relatively Inactive	
Weed Tox. Av.						
Total Tox. Av.						

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 4.

Chemical	2-methyl-3,6-dichlorobenzoic acid, dimethylamine salt					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	2W	4W	2W	4W	2W	4W
Crops [2]						
Alfalfa			100	100	95	100
B-ft trefoil			90	100	100	100
Buckwheat			80	95	90	95
Cabbage	100	100	80	100	70	90
Castorbeans			80	90	100	100
Corn	20	80	70	90	70	90
Cotton	100	100	100	100	100	100
Cowpeas			90	100	100	100
Cucumber			100	100	100	100
Flax			70	90	95	95
Lespedeza			100	100	95	100
Lima beans			95	95	90	95
Oats			20	50	30	50
Peanuts	80	90	90	100	100	100
Peas			50	90	100	100
Red clover			100	100	100	100
Safflower			100	100	95	100
Snapbeans			95	100	95	95
Sorghum			80	90	50	70
Soybeans	95	100	100	100	100	100
Squash			90	95	90	95
Sudan grass			80	90	50	70
Sugar beets	100	100	100	100	95	95
White clover			100	100	95	100
Crop Tox. Av.	83	95	86	96	88	93
Weeds						
Crabgrass			90	95	10	20
Ryegrass			10	30	0	10
Other grasses	30	70	90	95	20	40
Lambsquarters			100	100	90	95
Mustard			90	100	95	95
Pigweed			100	100	90	95
Other brdlf	90	95	90	100	70	90
Weed Tox. Av.	60	83	81	90	54	64
Total Tox. Av.	77	92	85	93	80	87

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 5.

Chemical	2,3,6-trichlorobenzaldehyde					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	2A	4A	2A	4A	2A	4A
Crops [2]						
Alfalfa			100	100	70	90
B-ft trefoil			95	100	90	95
Buckwheat			60	80	70	80
Cabbage	90	95	40	70	50	80
Castorbeans			50	80	80	90
Corn	10	20	40	60	60	80
Cotton	90	95	90	95	95	100
Cowpeas			90	95	80	90
Cucumber			90	95	90	100
Flax			70	90	70	90
Lespedeza			100	100	95	95
Lima beans			80	90	40	80
Oats			40	60	30	40
Peanuts	90	95	95	100	80	90
Peas			40	70	95	100
Red clover			100	100	95	95
Safflower			90	95	90	90
Snapbeans			90	95	80	95
Sorghum			40	60	40	60
Soybeans	95	100	100	100	95	100
Squash			90	95	60	80
Sudan grass			40	60	40	50
Sugar beets	95	100	90	100	90	95
White clover			100	100	90	90
Crop Tox. Av.	78	84	76	87	74	86
Weeds						
Crabgrass			70	90	0	10
Ryegrass			20	30	0	10
Other grasses	50	80	70	80	0	10
Lambsquarters			100	100	50	60
Mustard			40	70	40	60
Pigweed			100	100	50	70
Other brdlf	60	80	90	95	40	70
Weed Tox. Av.	55	80	70	81	26	41
Total Tox. Av.	73	83	75	86	64	76

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 6.

Chemical	2,3,6-trichlorobenzoic acid [2,3,6-TBA], nickel salt					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	2A	4A	2A	4A	2A	4A
Crops [2]						
Alfalfa			95	100	80	95
B-ft trefoil			90	95	70	90
Buckwheat			40	60	60	80
Cabbage	90	95	60	80	70	70
Castorbeans			70	90	100	100
Corn	20	30	20	50	70	80
Cotton	95	100	100	100	100	100
Cowpeas			90	95	95	100
Cucumber			95	100	100	100
Flax			70	95	70	80
Lespedeza			100	100	100	100
Lima beans			70	90	70	100
Oats			30	70	50	70
Peanuts	100	100	95	95	90	100
Peas			40	60	100	100
Red clover			95	100	100	100
Safflower			90	95	90	95
Snapbeans			95	95	95	100
Sorghum			40	50	40	50
Soybeans	95	100	100	100	100	100
Squash			90	90	80	90
Sudan grass			60	80	50	50
Sugar beets	70	95	95	100	95	95
White clover			100	100	70	95
Crop Tox. Av.	78	87	76	87	81	89
Weeds						
Crabgrass			70	90	0	10
Ryegrass			20	40	10	20
Other grasses	70	90	90	95	40	50
Lambsquarters			100	100	90	95
Mustard			60	95	60	80
Pigweed			100	100	80	95
Other brdlf	90	95	80	95	80	90
Weed Tox. Av.	80	93	74	88	51	63
Total Tox. Av.	79	88	76	87	74	83

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 7.

Chemical	2,3,6-trichlorobenzoic acid [2,3,6-TBA], sodium salt								
Application	Pre-planting			Pre-emergence			Post-emergence		
Rate lb/A [1]	2W	4W	4G	2W	4W	4G	2W	4W	4G
Crops [2]									
Alfalfa				100	100	100	95	95	90
B-ft trefoil				90	90	90	95	100	90
Buckwheat				30	60	60	90	95	70
Cabbage	95	95	90	60	90	60	80	90	60
Castorbeans				90	100	90	100	100	70
Corn	40	80	50	30	30	40	80	90	50
Cotton	100	100	100	90	100	90	100	100	70
Cowpeas				90	100	95	100	100	80
Cucumber				100	100	100	100	100	90
Flax				95	95	95	95	100	80
Lespedeza				100	100	100	100	100	100
Lima beans				90	100	90	100	100	40
Oats				40	40	50	50	80	50
Peanuts	100	100	95	100	100	100	90	95	95
Peas				40	70	60	100	100	100
Red clover				100	100	100	100	100	100
Safflower				95	95	95	100	100	80
Snapbeans				95	95	95	100	100	90
Sorghum				70	70	50	50	60	40
Soybeans	100	100	90	100	100	100	100	100	100
Squash				90	95	90	90	95	70
Sudan grass				50	90	80	40	60	40
Sugar beets	95	100	95	100	100	100	90	95	90
White clover				100	100	100	100	100	80
Crop Tox. Av.	88	96	87	80	88	85	90	94	76
Weeds									
Crabgrass				80	90	90	10	10	0
Ryegrass				20	20	20	10	10	0
Other grasses	10	100	90	90	90	90	50	70	30
Lambsquarters				100	100	100	95	95	20
Mustard				60	90	70	90	95	70
Pigweed				100	100	100	95	95	20
Other brdlf	80	100	90	90	95	95	90	95	10
Weed Tox. Av.	75	100	90	77	84	81	63	67	21
Total Tox. Av.	85	97	88	80	87	84	84	88	64

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 8.

Chemical	5-amino-2,3,6-trichlorobenzoic acid					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	2A	4A	2A	4A	2A	4A
Crops [2]						
Alfalfa			95	95	60	80
B-ft trefoil			60	90	60	80
Buckwheat			20	40	70	90
Cabbage	60	80	40	60	40	50
Castorbeans			30	50	60	80
Corn	0	10	30	30	30	40
Cotton	80	95	90	95	90	95
Cowpeas			60	80	70	90
Cucumber			60	80	60	80
Flax			40	60	60	90
Lespedeza			100	100	95	100
Lima beans			40	60	50	80
Oats			10	20	50	70
Peanuts	50	70	70	90	80	100
Peas			30	50	90	95
Red clover			100	100	95	100
Safflower			50	80	60	80
Snapbeans			60	80	80	90
Sorghum			40	70	40	60
Soybeans	70	90	80	90	60	80
Squash			60	80	50	70
Sudan grass			40	70	40	60
Sugar beets	70	90	100	100	60	80
White clover			80	90	60	80
Crop Tox. Av.	55	73	58	73	63	80
Weeds						
Crabgrass			70	90	20	40
Ryegrass			10	20	10	20
Other grasses	30	60	80	90	30	40
Lambsquarters			100	100	50	70
Mustard			50	50	30	40
Pigweed			100	100	60	80
Other brdlf	60	90	80	90	30	50
Weed Tox. Av.	45	75	70	77	33	54
Total Tox. Av.	53	73	61	74	56	74

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 9.

Chemical	5-nitro-2,3,6-trichlorobenzoic acid, dimethylamine salt					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	2W	4W	2W	4W	2W	4W
Crops [2]						
Alfalfa			90	95	70	90
B-ft trefoil			50	80	90	95
Buckwheat			30	60	60	70
Cabbage	30	60	30	60	50	70
Castorbeans			30	60	70	80
Corn	0	10	40	60	70	80
Cotton	50	90	95	100	100	100
Cowpeas			90	95	80	90
Cucumber			90	95	70	90
Flax			30	60	80	80
Lespedeza			100	100	95	100
Lima beans			40	70	50	80
Oats			40	60	40	40
Peanuts	70	90	70	90	80	95
Peas			40	60	90	95
Red clover			90	100	95	100
Safflower			60	80	80	90
Snapbeans			90	95	70	80
Sorghum			40	60	60	60
Soybeans	90	95	90	95	70	90
Squash			90	95	50	80
Sudan grass			60	80	60	70
Sugar beets	30	60	90	95	80	90
White clover			60	90	60	80
Crop Tox. Av.	45	68	64	81	72	83
Weeds						
Crabgrass			60	80	20	30
Ryegrass			0	10	0	10
Other grasses	30	60	70	90	20	30
Lambsquarters			100	100	70	90
Mustard			30	60	50	60
Pigweed			100	100	70	90
Other brdlf	40	70	80	95	50	60
Weed Tox. Av.	35	65	63	76	65	53
Total Tox. Av.	43	67	64	80	40	76

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 10.

Chemical	2-methoxy-3-methyl-5,6-dichlorobenzoic acid					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	2A	4A	2A	4A	2A	4A
Crops [2]						
Alfalfa			90	95	70	95
B-ft trefoil			90	95	80	95
Buckwheat			30	60	70	90
Cabbage	50	70	40	70	60	80
Castorbeans			30	50	80	95
Corn	30	50	40	60	50	70
Cotton	30	70	100	100	100	100
Cowpeas			60	80	90	95
Cucumber			100	100	60	70
Flax			30	50	70	90
Lespedeza			95	100	90	95
Lima beans			40	70	40	70
Oats			20	30	50	60
Peanuts	60	90	60	80	90	95
Peas			30	60	90	95
Red clover			100	100	95	95
Safflower			90	95	95	100
Snapbeans			70	90	80	90
Sorghum			40	60	40	60
Soybeans	50	80	60	80	90	95
Squash			95	95	50	70
Sudan grass			40	60	40	70
Sugar beets	60	90	100	100	95	95
White clover			90	95	90	95
Crop Tox. Av.	47	75	64	78	73	87
Weeds						
Crabgrass			50	80	20	30
Ryegrass			10	20	10	20
Other grasses	40	70	60	80	10	20
Lambsquarters			100	100	70	90
Mustard			60	90	80	95
Pigweed			100	100	70	90
Other brdlf	30	60	90	95	60	80
Weed Tox. Av.	35	65	81	81	46	61
Total Tox. Av.	44	73	70	79	67	81

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 11.

Chemical	polychlorobenzoic acid [PBA]					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	2A	4A	2A	4A	2A	4A
Crops [2]						
Alfalfa			90	95	50	80
B-ft trefoil			80	90	60	80
Buckwheat			30	60	40	50
Cabbage	70	90	80	95	30	40
Castorbeans			30	50	40	50
Corn	30	40	40	60	0	10
Cotton	50	70	80	95	70	95
Cowpeas			50	70	60	90
Cucumber			80	95	30	50
Flax			70	90	70	90
Lespedeza			95	100	80	100
Lima beans			40	70	30	60
Oats			40	60	10	20
Peanuts	70	90	95	95	70	90
Peas			40	60	60	100
Red clover			90	95	80	95
Safflower			80	90	70	90
Snapbeans			80	90	50	90
Sorghum			40	70	0	10
Soybeans	90	95	90	95	70	95
Squash			60	80	60	80
Sudan grass			40	60	0	30
Sugar beets	90	95	95	100	50	80
White clover			90	95	60	90
Crop Tox. Av.	67	80	67	82	48	69
Weeds						
Crabgrass			60	80	0	10
Ryegrass			40	60	0	10
Other grasses	40	70	60	80	10	20
Lambsquarters			95	100	60	95
Mustard			90	95	20	40
Pigweed			95	100	60	95
Other brdlf	90	95	90	95	30	70
Weed Tox. Av.	65	83	76	87	26	49
Total Tox. Av.	66	81	69	83	43	65

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 12.

Chemical	polychlorobenzoic acid [PBA], sodium salt					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	2W	4W	2W	4W	2W	4W
Crops [2]						
Alfalfa			90	95	80	90
B-ft trefoil			80	90	60	90
Buckwheat			40	60	30	50
Cabbage	80	100	80	95	20	60
Castorbeans			50	80	60	80
Corn	50	80	40	60	30	60
Cotton	90	95	90	95	80	100
Cowpeas			70	90	80	95
Cucumber			90	95	60	95
Flax			70	90	90	95
Lespedeza			100	100	80	100
Lima beans			50	90	40	60
Oats			50	80	10	20
Peanuts	70	90	90	95	80	95
Peas			40	60	80	100
Red clover			100	100	80	90
Safflower			80	95	90	95
Snapbeans			80	95	80	95
Sorghum			50	80	20	50
Soybeans	95	100	95	100	100	100
Squash			80	90	50	80
Sudan grass			50	80	20	50
Sugar beets	60	90	90	100	70	90
White clover			100	100	90	95
Crop Tox. Av.	74	93	73	88	62	81
Weeds						
Crabgrass			60	80	10	20
Ryegrass			60	80	10	20
Other grasses	50	70	50	70	20	30
Lambsquarters			95	100	70	95
Mustard			95	95	40	70
Pigweed			95	100	70	90
Other brdlf	90	95	95	95	50	70
Weed Tox. Av.	70	83	79	89	39	56
Total Tox. Av.	73	90	74	88	57	75

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 13.

Chemical	polychlorobenzoic acid [PBA], iso-octyl ester					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	2A	4A	2A	4A	2A	4A
Crops [2]						
Alfalfa						
B-ft trefoil						
Buckwheat						
Cabbage	80	90				
Castorbeans						
Corn	20	40				
Cotton	40	60				
Cowpeas						
Cucumber						
Flax						
Lespedeza						
Lima beans			Relatively Inactive		Relatively Inactive	
Oats						
Peanuts	40	60				
Peas						
Red clover						
Safflower						
Snapbeans						
Sorghum						
Soybeans	60	90				
Squash						
Sudan grass						
Sugar beets	90	95				
White clover						
Crop Tox. Av.	55	73				
Weeds						
Crabgrass						
Ryegrass						
Other grasses	30	50	Relatively Inactive		Relatively Inactive	
Lambsquarters						
Mustard						
Pigweed						
Other brdlf	60	80				
Weed Tox. Av.	45	65				
Total Tox. Av.	53	71				

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 14.

Chemical	3,4-dichloro-α-methoxyphenylacetic acid, sodium salt					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	2W	4W	2W	4W	2W	4W
Crops [2]						
Alfalfa			95	95	70	80
B-ft trefoil			50	70	20	40
Buckwheat			10	10	50	70
Cabbage			30	70	70	90
Castorbeans			10	20	90	100
Corn			30	60	40	60
Cotton			30	80	100	100
Cowpeas			10	20	90	95
Cucumber			10	40	80	95
Flax			30	60	90	95
Lespedeza			70	90	80	95
Lima beans	Relatively		10	40	60	80
Oats	Inactive		0	0	0	10
Peanuts			30	60	50	80
Peas			40	60	40	60
Red clover			80	90	80	95
Safflower			30	70	80	90
Snapbeans			40	70	80	90
Sorghum			20	60	20	30
Soybeans			50	80	90	95
Squash			10	10	50	70
Sudan grass			20	60	10	20
Sugar beets			50	80	90	95
White clover			50	70	90	95
Crop Tox. Av.			34	57	63	76
Weeds						
Crabgrass			10	50	20	40
Ryegrass			0	0	0	10
Other grasses	Relatively		20	50	20	40
Lambsquarters	Inactive		60	90	60	80
Mustard			40	70	80	90
Pigweed			70	90	40	60
Other brdlf			50	70	80	90
Weed Tox. Av.			36	60	43	59
Total Tox. Av.			34	58	59	72

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 15.

Chemical	2,3,6-trichlorophenylacetic acid [fenac], nickel salt					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	2A	4A	2A	4A	2A	4A
Crops [2]						
Alfalfa			100	100	90	95
B-ft trefoil			100	100	100	100
Buckwheat			40	60	70	80
Cabbage	90	95	95	95	40	50
Castorbeans			30	50	80	90
Corn	40	70	40	60	40	50
Cotton	95	100	100	100	100	100
Cowpeas			90	95	80	90
Cucumber			90	95	70	80
Flax			50	70	95	95
Lespedeza			100	100	100	100
Lima beans			40	60	70	80
Oats			30	50	40	50
Peanuts	90	95	90	95	70	80
Peas			60	80	95	100
Red clover			100	100	80	95
Safflower			90	95	60	70
Snapbeans			90	95	95	95
Sorghum			50	70	30	50
Soybeans	95	100	95	95	80	90
Squash			90	95	60	80
Sudan grass			50	70	40	60
Sugar beets	80	90	95	95	60	60
White clover			100	100	80	90
Crop Tox. Av.	82	92	76	84	72	80
Weeds						
Crabgrass			30	60	20	20
Ryegrass			20	40	0	10
Other grasses	70	90	30	60	50	60
Lambsquarters			100	100	50	70
Mustard			70	95	40	50
Pigweed			100	100	60	80
Other brdlf	80	95	70	95	50	70
Weed Tox. Av.	75	93	60	79	39	51
Total Tox. Av.	80	92	72	83	64	74

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 16.

Chemical	2,3,6-trichlorophenylacetic acid [fenac], sodium salt								
Application	Pre-planting			Pre-emergence			Post-emergence		
Rate lb/A [1]	2W	4W	4G	2W	4W	4G	2W	4W	4G
Crops [2]									
Alfalfa				100	100	100	90	90	60
B-ft trefoil				100	100	100	100	100	70
Buckwheat				40	80	60	70	80	50
Cabbage	90	95	100	100	100	100	40	50	50
Castorbeans				70	80	80	95	95	40
Corn	95	95	95	60	80	60	30	50	40
Cotton	100	100	100	100	100	100	100	100	90
Cowpeas				95	95	95	95	95	60
Cucumber				100	100	100	70	95	60
Flax				70	80	90	100	100	20
Lespedeza				100	100	100	100	100	100
Lima beans				95	95	80	50	70	20
Oats				50	60	40	40	40	30
Peanuts	95	95	95	95	95	95	70	80	70
Peas				60	70	70	100	100	100
Red clover				100	100	100	90	95	60
Safflower				95	95	100	60	80	40
Snapbeans				95	95	95	95	95	60
Sorghum				50	80	70	30	50	60
Soybeans	100	100	100	95	95	95	90	95	40
Squash				95	95	95	90	80	60
Sudan grass				50	80	70	40	60	60
Sugar beets	90	95	100	95	100	100	70	80	60
White clover				100	100	100	90	90	50
Crop Tox. Av.	95	97	98	84	91	87	74	82	54
Weeds									
Crabgrass				90	95	80	20	20	10
Ryegrass				60	80	80	10	30	30
Other grasses	80	90	95	90	95	90	60	50	30
Lambsquarters				100	100	100	60	70	30
Mustard				95	100	95	70	90	10
Pigweed				100	100	100	60	60	50
Other brdlf	90	95	95	90	100	95	60	70	40
Weed Tox. Av.	85	93	95	90	96	91	47	57	29
Total Tox. Av.	93	96	98	85	92	88	68	77	48

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 17.

Chemical	2-methoxy-3,5,6-trichlorophenylacetic acid					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	2A	4A	2A	4A	2A	4A
Crops [2]						
Alfalfa			90	95		
B-ft trefoil			70	95		
Buckwheat			0	10		
Cabbage	30	80	70	95		
Castorbeans			0	10		
Corn	0	30	10	20		
Cotton	10	40	95	100		
Cowpeas			20	40		
Cucumber			80	95		
Flax			10	30		
Lespedeza			90	95		
Lima beans			30	60	Relatively	
Oats			10	20	Inactive	
Peanuts	30	50	60	80		
Peas			50	70		
Red clover			90	95		
Safflower			40	60		
Snapbeans			50	80		
Sorghum			20	40		
Soybeans	30	60	70	90		
Squash			0	10		
Sudan grass			40	60		
Sugar beets	30	80	95	95		
White clover			90	95		
Crop Tox. Av.	22	57	49	64		
Weeds						
Crabgrass			50	70		
Ryegrass			10	10		
Other grasses	30	70	50	70		
Lambsquarters			60	80	Relatively	
Mustard			40	70	Inactive	
Pigweed			60	80		
Other brdlf	30	50	40	60		
Weed Tox. Av.	30	60	44	63		
Total Tox. Av.	24	58	48	94		

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 18.

Chemical	trichloro-2,4-dimethylphenylacetic acid					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	2A	4A	2A	4A	2A	4A
Crops [2]						
Alfalfa			30	50		
B-ft trefoil			30	50		
Buckwheat			0	10		
Cabbage	90	95	30	70		
Castorbeans			0	10		
Corn	20	30	0	10		
Cotton	50	70	30	50		
Cowpeas			0	10		
Cucumber			30	50		
Flax			0	10		
Lespedeza			60	80		
Lima beans			20	40	Relatively	
Oats			0	10	Inactive	
Peanuts	30	70	10	20		
Peas			30	40		
Red clover			30	50		
Safflower			30	50		
Snapbeans			40	60		
Sorghum			0	10		
Soybeans	50	80	40	60		
Squash			0	10		
Sudan grass			0	10		
Sugar beets	70	95	20	40		
White clover			30	60		
Crop Tox. Av.	52	73	19	36		
Weeds						
Crabgrass			20	30		
Ryegrass			0	0		
Other grasses	30	40	20	30		
Lambsquarters			50	60		
Mustard			10	30		
Pigweed			50	60		
Other brdlf	80	90	10	30		
Weed Tox. Av.	60	65	23	34		
Total Tox. Av.	54	71	20	36		

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 19.

Chemical	2-chloro-4,6-bis(ethylamino)-s-triazine [simazine]								
Application	Pre-planting			Pre-emergence			Post-emergence		
Rate lb/A 1/	4W	8W	8G	4W	8W	8G	4W	8W	8G
Crops 2/									
Alfalfa				100	100	100	80	90	90
B-ft trefoil				100	100	100	50	80	90
Buckwheat				100	100	100	95	100	100
Cabbage	100	100	100	100	100	100	95	100	100
Castorbeans				100	100	100	100	100	100
Corn	0	10	10	10	10	10	0	0	0
Cotton	100	100	100	95	95	90	90	90	90
Cowpeas				100	100	100	100	100	95
Cucumber				100	100	100	100	100	100
Flax				100	100	100	60	60	60
Lespedeza				100	100	100	90	95	95
Lima beans				100	100	100	60	90	80
Oats				70	60	80	20	40	60
Peanuts	100	100	100	95	95	90	95	95	100
Peas				60	70	70	90	95	95
Red clover				100	100	100	95	95	100
Safflower				100	100	100	95	100	95
Snapbeans				100	100	100	95	95	100
Sorghum				20	30	20	0	0	0
Soybeans	100	100	100	100	100	95	95	100	95
Squash				100	100	100	100	100	100
Sudan grass				20	30	20	10	30	0
Sugar beets	100	100	100	100	100	100	100	100	100
White clover				100	100	100	95	100	100
Crop Tox. Av.	83	85	85	86	87	87	75	82	81
Weeds									
Crabgrass				100	100	100	10	20	30
Ryegrass				90	90	90	30	40	60
Other grasses	100	100	100	100	100	100	10	20	30
Lambsquarters				100	100	100	95	100	95
Mustard				100	100	100	95	95	95
Pigweed				100	100	100	95	100	100
Other brdlf	100	100	100	100	100	100	95	95	95
Weed Tox. Av.	100	100	100	99	99	99	61	67	72
Total Tox. Av.	88	89	89	89	90	89	72	78	79

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 20.

Chemical	2-chloro-4-ethylamino-6-isopropylamino-s-triazine [atrazine]								
Application	Pre-planting			Pre-emergence			Post-emergence		
Rate lb/A [1]	4W	8W	8G	4W	8W	8G	4W	8W	8G
Crops [2]									
Alfalfa				100	100	100	100	100	40
B-ft trefoil				100	100	100	100	100	60
Buckwheat				100	100	100	100	100	60
Cabbage	100	100	100	100	100	100	100	100	80
Castorbeans				100	100	100	100	100	100
Corn	0	10	10	10	10	10	0	10	0
Cotton	100	100	100	95	100	100	100	100	70
Cowpeas				100	100	100	100	100	90
Cucumber				100	100	100	100	100	100
Flax				100	100	100	95	100	20
Lespedeza				100	100	100	100	100	40
Lima beans				100	100	100	100	100	40
Oats				100	100	100	95	95	80
Peanuts	100	100	100	100	100	100	100	100	50
Peas				100	100	100	100	100	60
Red clover				100	100	100	100	100	90
Safflower				100	100	100	100	100	40
Snapbeans				100	100	100	100	100	40
Sorghum				20	30	20	20	30	0
Soybeans	100	100	100	100	100	100	100	100	50
Squash				100	100	100	100	100	90
Sudan grass				20	30	35	20	30	0
Sugar beets	100	100	100	100	100	100	100	100	80
White clover				100	100	100	100	100	90
Crop Tox. Av.	83	85	85	89	90	90	89	90	57
Weeds									
Crabgrass				100	100	100	80	90	10
Ryegrass				100	100	100	100	100	30
Other grasses	100	100	100	100	100	100	80	90	10
Lambsquarters				100	100	100	100	100	50
Mustard				100	100	100	100	100	50
Pigweed				100	100	100	100	100	50
Other brdlf	100	100	100	100	100	100	95	95	50
Weed Tox. Av.	100	100	100	100	100	100	94	97	36
Total Tox. Av.	88	89	89	92	93	92	90	92	52

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 21.

Chemical	2-methylthio-4,6-bis(3-methoxypropylamino)-s-triazine					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	4W	8W	4W	8W	4W	8W
Crops [2]						
Alfalfa			95	100	70	90
B-ft trefoil			100	100	95	100
Buckwheat			95	100	100	100
Cabbage	90	95	100	100	100	100
Castorbeans			50	70	100	100
Corn	10	20	30	30	100	100
Cotton	50	70	90	95	100	100
Cowpeas			80	90	100	100
Cucumber			100	100	100	100
Flax			30	30	20	40
Lespedeza			100	100	100	100
Lima beans			90	90	100	100
Oats			10	40	90	95
Peanuts	50	70	30	30	100	100
Peas			20	20	100	100
Red clover			100	100	95	100
Safflower			70	80	100	100
Snapbeans			95	95	100	100
Sorghum			10	35	95	95
Soybeans	10	30	60	80	100	100
Squash			50	80	100	100
Sudan grass			10	30	80	90
Sugar beets	80	90	100	100	100	100
White clover			100	100	95	100
Crop Tox. Av.	48	63	67	75	93	96
Weeds						
Crabgrass			100	100	95	100
Ryegrass			90	95	95	100
Other grasses	30	50	100	100	95	100
Lambsquarters			100	100	100	100
Mustard			100	100	95	100
Pigweed			100	100	100	100
Other brdlf	30	50	100	100	95	95
Weed Tox. Av.	30	50	99	99	96	99
Total Tox. Av.	44	59	74	80	94	97

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 22.

Chemical	isopropyl N-(3-chlorophenyl)carbamate [CIPC]									
Application	Pre-planting			Pre-emergence			Post-emergence			
Rate lb/A [1]	4W	8W	8G	4W	8W	8G	2W	4W	8W	8G
Crops [2]										
Alfalfa				40	80	80	10	20	40	10
B-ft trefoil				95	100	95	10	20	40	50
Buckwheat				100	100	100	30	50	70	50
Cabbage	50	60	60	90	95	90	40	50	70	40
Castorbeans				30	50	40	30	40	70	60
Corn	50	60	60	60	60	70	20	30	40	20
Cotton	30	60	30	40	80	70	50	80	95	80
Cowpeas				50	50	60	40	40	70	40
Cucumber				100	100	100	50	70	90	80
Flax				100	100	100	50	70	80	70
Lespedeza				95	95	95	40	70	90	80
Lima beans				30	70	90	30	50	80	30
Oats				70	70	70	20	40	70	20
Peanuts	50	60	40	50	70	70	40	60	80	40
Peas				40	50	50	30	40	60	60
Red clover				95	100	95	30	40	60	50
Safflower				10	20	10	40	50	70	40
Snapbeans				60	80	90	40	60	90	60
Sorghum				50	70	70	10	20	30	30
Soybeans	20	60	30	40	60	70	30	50	70	30
Squash				30	70	60	10	30	50	20
Sudan grass				50	70	70	10	30	40	20
Sugar beets	40	50	40	70	80	80	20	40	50	40
White clover				80	90	80	40	50	70	40
Crop Tox. Av.	40	58	43	62	75	75	30	46	66	46
Weeds										
Crabgrass				80	90	80	20	40	50	30
Ryegrass				95	95	95	30	50	70	70
Other grasses	50	80	80	70	90	90	20	30	50	30
Lambsquarters				70	90	80	20	30	70	40
Mustard				95	100	100	30	50	90	40
Pigweed				60	90	80	20	40	70	40
Other brdlf	50	60	60	70	90	80	20	40	70	40
Weed Tox. Av.	50	70	70	77	92	86	23	40	67	41
Total Tox. Av.	43	61	50	65	79	78	28	45	66	45

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 23.

Chemical	ethyl N,N-di-n-propylthiolcarbamate [EPTC]								
Application	Pre-planting			Pre-emergence			Post-emergence		
Rate lb/A [1]	4W	8W	8G	4W	8W	8G	4W	8W	8G
Crops [2]									
Alfalfa				40	50	60	20	20	20
B-ft trefoil				10	30	20	30	30	20
Buckwheat				50	80	100	20	30	10
Cabbage	50	90	95	30	30	40	90	95	50
Castorbeans				20	30	30	95	95	70
Corn	0	10	0	40	50	50	30	30	20
Cotton	0	20	70	30	60	80	60	90	95
Cowpeas				40	50	60	70	80	60
Cucumber				30	70	70	50	70	50
Flax				10	20	20	40	40	30
Lespedeza				20	30	30	0	0	0
Lima beans				30	60	50	40	50	40
Oats				60	80	60	10	20	10
Peanuts	0	10	10	40	70	80	0	0	0
Peas				10	40	30	60	60	40
Red clover				20	40	30	30	30	20
Safflower				20	40	30	20	20	10
Snapbeans				20	40	40	30	30	30
Sorghum				60	90	70	10	10	0
Soybeans	10	30	50	20	30	40	50	70	50
Squash				20	30	20	20	30	10
Sudan grass				60	90	70	20	30	10
Sugar beets	10	30	40	10	20	20	60	60	40
White clover				20	40	30	30	30	20
Crop Tox. Av.	12	32	44	30	49	47	37	43	29
Weeds									
Crabgrass				60	90	90	10	20	10
Ryegrass				90	95	95	20	30	60
Other grasses	20	80	95	90	95	90	10	20	10
Lambsquarters				40	60	70	0	0	0
Mustard				10	10	20	10	10	0
Pigweed				40	70	60	0	0	0
Other brdlf	30	60	80	40	60	60	10	10	10
Weed Tox. Av.	25	70	88	53	69	70	9	13	13
Total Tox. Av.	15	41	55	35	53	52	31	36	26

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 24.

Chemical	2-chloroallyl dipropyldithiocarbamate					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	4W	8W	4W	8W	4W	8W
Crops	[2]					
Alfalfa			0	0	10	30
B-ft trefoil			10	20	10	20
Buckwheat			90	95	10	20
Cabbage			20	40	10	20
Castorbeans			0	0	10	40
Corn			0	0	10	30
Cotton			0	0	50	70
Cowpeas			0	0	10	40
Cucumber			0	0	50	70
Flax			0	0	30	40
Lespedeza			10	20	20	40
Lima beans	Relatively		0	0	10	20
Oats	Inactive		0	0	20	40
Peanuts			0	0	20	40
Peas			0	20	10	40
Red clover			10	20	10	50
Safflower			0	0	0	10
Snapbeans			0	0	10	20
Sorghum			0	0	0	10
Soybeans			0	0	40	60
Squash			0	0	10	40
Sudan grass			0	0	10	20
Sugar beets			0	0	40	50
White clover			10	20	30	60
Crop Tox. Av.			6	10	18	37
Weeds						
Crabgrass			10	20	20	50
Ryegrass			70	90	10	20
Other grasses			0	0	10	20
Lambsquarters	Relatively		0	0	10	20
Mustard	Inactive		0	0	10	10
Pigweed			40	60	10	20
Other brdlf			10	20	10	20
Weed Tox. Av.			19	27	11	23
Total Tox. Av.			9	14	17	34

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 25.

Chemical	3-(3,4-dichlorophenyl)-1,1-dimethylurea [diuron]					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	2W	4W	2W	4W	2W	4W
Crops [2]						
Alfalfa			100	100	100	100
B-ft trefoil			100	100	100	100
Buckwheat			90	100	100	100
Cabbage	100	100	100	100	100	100
Castorbeans			70	90	100	100
Corn	100	100	30	70	100	100
Cotton	80	90	60	90	100	100
Cowpeas			70	100	100	100
Cucumber			100	100	100	100
Flax			100	100	95	100
Lespedeza			100	100	100	100
Lima beans			90	100	100	100
Oats			40	60	90	95
Peanuts	100	100	80	90	100	100
Peas			70	100	100	100
Red clover			100	100	100	100
Safflower			90	100	100	100
Snapbeans			100	100	100	100
Sorghum			60	90	95	100
Soybeans	100	100	100	100	100	100
Squash			90	100	100	100
Sudan grass			60	90	70	90
Sugar beets			100	100	100	100
White clover			100	100	100	100
Crop Tox. Av.	97	98	83	95	98	99
Weeds						
Crabgrass			100	100	100	100
Ryegrass			95	100	100	100
Other grasses	100	100	95	95	100	100
Lambsquarters			100	100	100	100
Mustard			100	100	100	100
Pigweed			100	100	100	100
Other brdlf	100	100	95	100	100	100
Weed Tox. Av.	100	100	98	99	100	100
Total Tox. Av.	98	99	87	96	98	100

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 26.

Chemical	2,3,5,6-tetrachloroterephthalic acid, dimethyl ester					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	4W	8W	4W	8W	4W	8W
Crops [2]						
Alfalfa			40	80	10	20
B-ft trefoil			70	80	0	0
Buckwheat			50	80	80	90
Cabbage			35	55	0	20
Castorbeans			20	40	100	100
Corn			30	60	0	0
Cotton			10	20	70	80
Cowpeas			30	50	90	95
Cucumber			10	30	80	90
Flax			10	20	0	0
Lespedeza			70	80	0	0
Lima beans	Relatively		10	20	50	60
Oats	Inactive		20	40	0	0
Peanuts			30	50	0	10
Peas			30	30	20	30
Red clover			70	90	10	20
Safflower			20	20	0	0
Snapbeans			10	20	20	30
Sorghum			40	60	0	0
Soybeans			10	20	60	70
Squash			40	80	30	40
Sudan grass			40	60	10	10
Sugar beets			70	90	50	60
White clover			70	90	10	10
Crop Tox. Av.			35	53	29	35
Weeds						
Crabgrass			95	95	0	0
Ryegrass			10	20	0	0
Other grasses	Relatively		50	80	10	10
Lambsquarters	Inactive		80	90	0	0
Mustard			20	50	0	0
Pigweed			50	90	0	0
Other brdlf			50	80	10	10
Weed Tox. Av.			51	72	3	3
Total Tox. Av.			38	57	23	28

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 27.

Chemical	O-(2,4-dichlorophenyl) O-methyl isopropylphosphoramidothioate					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	10W	20W	10W	20W	10W	20W
Crops [2]						
Alfalfa			40	80	20	50
B-ft trefoil			20	50	10	40
Buckwheat			70	100	40	80
Cabbage			40	80	70	90
Castorbeans			20	30	95	100
Corn			0	0	40	70
Cotton			20	40	70	95
Cowpeas			20	30	90	95
Cucumber			10	40	95	100
Flax			20	70	70	80
Lespedeza			60	95	90	95
Lima beans	Relatively Inactive		0	0	90	95
Oats			0	0	30	50
Peanuts			40	60	70	100
Peas			20	60	40	70
Red clover			50	80	10	40
Safflower			0	0	40	60
Snapbeans			30	50	70	90
Sorghum			0	10	40	70
Soybeans			20	40	80	95
Squash			20	50	90	95
Sudan grass			0	20	20	40
Sugar beets			50	90	80	90
White clover			50	80	10	40
Crop Tox. Av.			25	48	57	76
Weeds						
Crabgrass			50	70	80	95
Ryegrass			20	50	20	30
Other grasses			50	70	20	30
Lambsquarters	Relatively Inactive		90	100	80	95
Mustard			20	60	10	20
Pigweed			80	100	80	95
Other brdlf			60	90	20	30
Weed Tox. Av.			53	77	44	56
Total Tox. Av.			31	55	54	72

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 28.

Chemical	trimethylsulfonium chloride					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1/]					6W	8W
Crops [2/]						
Alfalfa					60	80
B-ft trefoil					70	90
Buckwheat					40	70
Cabbage					0	10
Castorbeans					20	60
Corn					95	95
Cotton					100	100
Cowpeas					50	70
Cucumber					40	70
Flax					40	60
Lespedeza					80	95
Lima beans	Not Applied		Not Applied		40	60
Oats					90	95
Peanuts					0	10
Peas					30	50
Red clover					70	90
Safflower					10	30
Snapbeans					40	70
Sorghum					60	90
Soybeans					50	60
Squash					60	80
Sudan grass					95	100
Sugar beets					50	70
White clover					80	90
Crop Tox. Av.					53	71
Weeds						
Crabgrass					50	70
Ryegrass					40	60
Other grasses					80	90
Lambsquarters	Not Applied		Not Applied		80	90
Mustard					50	70
Pigweed					90	95
Other brdlf					90	95
Weed Tox. Av.					69	81
Total Tox. Av.					57	73

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 29.

Chemical	2-dimethylamino -1,4-naphthoquinone		2-N-propylamino -1,4-naphthoquinone		2-isopropylamino -1,4-naphthoquinone	
Application	Post-emergence		Post-emergence		Post-emergence	
Rate lb/A [1]	1A	2A	1A	2A	1A	2A
Crops [2]						
Alfalfa	20	40	50	70	10	20
B-ft trefoil	20	30	50	80	40	60
Buckwheat	0	10	0	10	20	30
Cabbage	30	80	20	30	10	30
Castorbeans	60	80	20	40	40	80
Corn	0	0	0	0	0	10
Cotton	60	80	40	80	30	60
Cowpeas	50	70	50	80	50	80
Cucumber	40	90	40	80	30	80
Flax	20	40	10	20	40	60
Lespedeza	50	80	60	90	30	80
Lima beans	40	50	30	70	20	50
Oats	0	10	0	0	0	0
Peanuts	0	10	0	0	0	10
Peas	50	70	60	80	60	90
Red clover	20	40	50	80	40	60
Safflower	30	60	20	50	10	40
Snapbeans	60	80	40	60	70	90
Sorghum	0	20	0	0	0	10
Soybeans	40	70	30	50	30	60
Squash	10	20	10	20	20	30
Sudan grass	20	30	20	30	0	10
Sugar beets	20	40	30	50	40	70
White clover	60	80	50	80	60	90
Crop Tox. Av.	29	49	28	48	27	50
Weeds						
Crabgrass	0	10	20	30	10	20
Ryegrass	0	0	0	20	10	20
Other grasses	0	10	10	20	0	0
Lambsquarters	40	70	50	60	40	70
Mustard	20	40	20	40	20	40
Pigweed	60	90	50	70	40	90
Other brdlf	30	40	40	60	30	50
Weed Tox. Av.	21	37	27	43	36	41
Total Tox. Av.	27	47	28	47	26	48

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 30.

Chemical	crude amine residues					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	4W	8W	4W	8W	4W	8W
Crops [2]						
Alfalfa						
B-ft trefoil						
Buckwheat						
Cabbage						
Castorbeans						
Corn						
Cotton						
Cowpeas						
Cucumber						
Flax						
Lespedeza						
Lima beans	Relatively Inactive		Relatively Inactive		Relatively Inactive	
Oats						
Peanuts						
Peas						
Red clover						
Safflower						
Snapbeans						
Sorghum						
Soybeans						
Squash						
Sudan grass						
Sugar beets						
White clover						
Crop Tox. Av.						
Weeds						
Crabgrass						
Ryegrass						
Other grasses						
Lambsquarters	Relatively Inactive		Relatively Inactive		Relatively Inactive	
Mustard						
Pigweed						
Other brdlf						
Weed Tox. Av.						
Total Tox. Av.						

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 31.

Chemical	2-methyl imidazole					
Application	Pre-planting		Pre-emergence		Post-emergence	
Rate lb/A [1]	4A	8A	4A	8A	2A	4A
Crops [2]						
Alfalfa B-ft trefoil Buckwheat Cabbage Castorbeans Corn Cotton Cowpeas Cucumber Flax Lespedeza Lima beans Oats Peanuts Peas Red clover Safflower Snapbeans Sorghum Soybeans Squash Sudan grass Sugar beets White clover	Relatively Inactive		Relatively Inactive		Relatively Inactive	
Crop Tox. Av.						
Weeds						
Crabgrass Ryegrass Other grasses Lambsquarters Mustard Pigweed Other brdlf	Relatively Inactive		Relatively Inactive		Relatively Inactive	
Weed Tox. Av.						
Total Tox. Av.						

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 32.

Chemical	4,6-dinitro-o-sec-butylphenol [DNBP], alkanolamine salts									
Application	Pre-planting			Pre-emergence			Post-emergence			
Rate lb/A [1]	4W	8W	8G	4W	8W	8G	2W	4W	8W	8G
Crops [2]										
Alfalfa				95	100	95	20	40	80	10
B-ft trefoil				90	95	90	80	90	95	30
Buckwheat				100	100	100	95	95	100	30
Cabbage	20	50	40	100	100	100	100	100	100	100
Castorbeans				40	40	50	100	100	100	100
Corn	20	30	20	50	50	70	40	80	95	40
Cotton	20	60	30	50	50	70	95	95	100	80
Cowpeas				40	50	40	95	100	100	60
Cucumber				80	90	90	95	95	100	90
Flax				60	95	90	80	90	95	40
Lespedeza				50	90	60	30	70	95	30
Lima beans				20	70	40	40	60	90	50
Oats				50	70	70	50	60	80	20
Peanuts	20	40	40	50	80	70	10	30	30	20
Peas				50	70	50	60	90	95	60
Red clover				90	95	90	70	90	95	30
Safflower				90	100	100	100	100	100	95
Snapbeans				40	70	70	90	90	95	30
Sorghum				30	50	60	40	70	90	30
Soybeans	20	60	20	20	50	70	90	95	95	40
Squash				40	80	80	90	95	95	50
Sudan grass				30	50	60	40	70	80	40
Sugar beets	30	60	40	100	100	100	100	100	100	95
White clover				90	95	90	70	80	90	30
Crop Tox. Av.	22	50	32	61	77	75	70	83	92	50
Weeds										
Crabgrass				90	95	80	30	60	95	40
Ryegrass				60	90	80	30	60	90	30
Other grasses	20	30	40	90	95	90	30	50	90	40
Lambsquarters				100	100	95	95	100	100	40
Mustard				100	100	100	100	100	100	90
Pigweed				90	100	90	95	100	100	40
Other brdlf	20	30	40	90	95	80	95	95	100	50
Weed Tox. Av.	20	30	40	89	96	88	68	81	96	47
Total Tox. Av.	21	45	34	67	81	78	70	82	93	49

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 33.

Chemical	2,4-dichlorophenoxyacetic acid [2,4-D], alkanolamine salts									
Application	Pre-planting			Pre-emergence			Post-emergence			
Rate lb/A [1]	2W	4W	4G	2W	4W	4G	1W	2W	4W	4G
Crops [2]										
Alfalfa				100	100	100	100	100	100	70
B-ft trefoil				100	100	100	95	100	100	50
Buckwheat				50	70	80	95	100	100	60
Cabbage				100	100	100	95	100	100	70
Castorbeans				40	90	90	100	100	100	100
Corn				60	60	90	20	40	70	10
Cotton				50	90	90	100	100	100	95
Cowpeas				60	95	90	100	100	100	95
Cucumber				70	90	100	95	100	100	40
Flax				60	80	50	90	95	95	40
Lespedeza				95	95	95	100	100	100	80
Lima beans	Relatively			60	90	95	100	100	100	40
Oats	Inactive			60	90	90	10	20	30	10
Peanuts				80	90	90	20	30	70	10
Peas				30	60	30	100	100	100	80
Red clover				100	100	100	100	100	100	90
Safflower				90	100	100	100	100	100	90
Snapbeans				50	70	70	95	100	100	80
Sorghum				95	100	95	20	30	40	10
Soybeans				50	70	60	100	100	100	90
Squash				95	95	90	80	90	95	50
Sudan grass				95	100	95	30	40	50	20
Sugar beets				100	100	100	100	100	100	95
White clover				100	100	100	95	100	100	70
Crop Tox. Av.				75	89	88	81	85	90	60
Weeds										
Crabgrass				70	80	90	0	0	10	0
Ryegrass				20	40	70	0	0	10	10
Other grasses	Relatively			95	95	95	10	20	30	0
Lambsquarters	Inactive			95	95	90	100	100	100	90
Mustard				100	100	100	95	100	100	80
Pigweed				100	100	100	95	100	100	90
Other brdlf				95	95	95	95	100	100	80
Weed Tox. Av.				82	86	86	56	60	64	50
Total Tox. Av.				76	88	88	75	80	84	58

1/ A = acetone; W = water; G = granular

2/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 34. A brief generalized summary of preliminary pre-planting data by crop and chemical for easy reference for selection of chemicals for specific crops.[1/]

Chemical	Crops: Cabbage	Corn	Cotton	Peanuts	Soybeans	Sugar beets	Weeds: Grasses	Broadleaf
3-amino-2,5-dichlorobenzoic acid [amiben], Table 1	X	X	X	X	X	X		
3-nitro-2,5-dichlorobenzoic acid, Table 2				X			X	
2-amino-3,5-dichlorobenzoic acid, Table 3								
2-methyl-3,6-dichlorobenzoic acid, dimethylamine salt, Table 4		X					X	X
2,3,6-trichlorobenzaldehyde, Table 5		X					X	X
2,3,6-trichlorobenzoic acid [2,3,6-TBA], nickel salt, Table 6		X					X	X
2,3,6-trichlorobenzoic acid [2,3,6-TBA], sodium salt, Table 7							X	X
5-amino-2,3,6-trichlorobenzoic acid, Table 8		X						X
5-nitro-2,3,6-trichlorobenzoic acid, dimethylamine salt, Table 9	X	X				X		X
2-methoxy-3-methyl-5,6-dichlorobenzoic acid, Table 10		X	X				X	
polychlorobenzoic acid [PBA], Table 11		X					X	X
polychlorobenzoic acid [PBA], sodium salt, Table 12							X	X
polychlorobenzoic acid [PBA], iso-octyl ester, Table 13		X						X
3,4-dichloro-α-methoxyphenylacetic acid, sodium salt, Table 14								
2,3,6-trichlorophenylacetic acid [fenac], nickel salt, Table 15							X	X
2,3,6-trichlorophenylacetic acid [fenac], sodium salt, Table 16							X	X
2-methoxy-3,5,6-trichlorophenylacetic acid, Table 17	X	X	X	X	X	X	X	
trichloro-2,4-dimethylphenylacetic acid, Table 18		X		X				X
2-chloro-4,6-bis(ethylamino)-s-triazine [simazine], Table 19		X					X	X
2-chloro-4-ethylamino-6-isopropylamino-s-triazine [atrazine], Table 20		X					X	X
2-methylthio-4,6-bis(3-methoxypropylamino)-s-triazine, Table 21		X			X			
isopropyl N-(3-chlorophenyl)carbamate [CIPC], Table 22			X		X		X	
ethyl N,N-di-n-propylthiolcarbamate [EPTC], Table 23		X	X	X	X	X	X	X
2-chloroallyl dipropyldithiocarbamate, Table 24								
3-(3,4-dichlorophenyl)-1,1-dimethylurea [diuron], Table 25							X	X
2,3,5,6-tetrachloroterephthalic acid, dimethyl ester, Table 26								
O-(2,4-dichlorophenyl) O-methyl isopropylphosphoramidothioate, Table 27								
4,6-dinitro-o-sec-butylphenol [DNBP], alkanolamine salts, Table 32	X	X	X	X	X	X		
2,4-dichlorophenoxyacetic acid [2,4-D], alkanolamine salts, Table 33								

1/ Checks are placed opposite crops that tolerated respective chemicals (Phytotoxicity index, 30 or less).
Checks are placed opposite weeds controlled by respective chemicals (Phytotoxicity index, 70 or more).

Table 35. A brief generalized summary of preliminary pre-emergence data by crop and chemical for easy reference for selection of chemicals for specific crops. 1/

	Chemical	3-amino-2,5-dichlorobenzoic acid [amiben], Table 1	3-nitro-2,5-dichlorobenzoic acid, Table 2	2-amino-3,5-dichlorobenzoic acid, Table 3	2-methyl-3,6-dichlorobenzoic acid, dimethylamine salt, Table 4	2,3,6-trichlorobenzaldehyde, Table 5	2,3,6-trichlorobenzoic acid [2,3,6-TBA], nickel salt, Table 6	2,3,6-trichlorobenzoic acid [2,3,6-TBA], sodium salt, Table 7	5-amino-2,3,6-trichlorobenzoic acid, Table 8	5-nitro-2,3,6-trichlorobenzoic acid, dimethylamine salt, Table 9	2-methoxy-3-methyl-5,6-dichlorobenzoic acid, Table 10	polychlorobenzoic acid [PBA], Table 11	polychlorobenzoic acid [PBA], sodium salt, Table 12	polychlorobenzoic acid [PBA], iso-octyl ester, Table 13	3,4-dichloro-α-methoxyphenylacetic acid, sodium salt, Table 14	2,3,6-trichlorophenylacetic acid [fenac], nickel salt, Table 15
	Crops															
Small Seeded Legume Crops	Alfalfa															
	B-ft. trefoil															
	Lespedeza															
	Red clover															
	White clover															
Cereals and Forage Crops	Buckwheat							X	X	X	X	X			X	
	Corn						X	X	X						X	
	Oats				X		X		X		X				X	X
	Sorghum														X	
	Sudangrass														X	
Oilseed and Fiber Crops	Castorbeans								X	X	X	X			X	X
	Cotton														X	
	Flax	X	X							X	X				X	
	Peanuts		X												X	
	Safflower		X												X	
	Soybeans	X														
Root Crops	Sugar beets															
Vegetable Crops	Cabbage									X					X	
	Cowpeas														X	
	Cucumber														X	
	Lima beans	X	X												X	
	Peas	X	X						X		X					
	Snapbeans	X														
	Squash	X	X												X	
	Weeds															
	Grasses	X	X		X	X	X	X	X	X	X	X	X			
	Broadleaf	X	X		X	X	X	X	X	X	X	X	X		X	X

1/ Checks are placed opposite crops that tolerated respective chemicals (Phytotoxicity index, 30 or less).
Checks are placed opposite weeds controlled by respective chemicals (Phytotoxicity index, 70 or more).

Table 35. Continued.

Weeds: Broadleaf	Weeds: Grasses	Vegetable Crops: Squash	Vegetable Crops: Snapbeans	Vegetable Crops: Peas	Vegetable Crops: Lima beans	Vegetable Crops: Cucumber	Vegetable Crops: Cowpeas	Vegetable Crops: Cabbage	Root Crops: Sugar beets	Oilseed and Fiber Crops: Soybeans	Oilseed and Fiber Crops: Safflower	Oilseed and Fiber Crops: Peanuts	Oilseed and Fiber Crops: Flax	Oilseed and Fiber Crops: Cotton	Oilseed and Fiber Crops: Castorbeans	Cereals and Forage Crops: Sudangrass	Cereals and Forage Crops: Sorghum	Cereals and Forage Crops: Oats	Cereals and Forage Crops: Corn	Cereals and Forage Crops: Buckwheat	Small Seeded Legume Crops: White clover	Small Seeded Legume Crops: Red clover	Small Seeded Legume Crops: Lespedeza	Small Seeded Legume Crops: B-ft. trefoil	Small Seeded Legume Crops: Alfalfa	Chemical
x	x																									2,3,6-trichlorophenylacetic acid [fenac], sodium salt, Table 16
x	x	x			x		x						x		x		x		x	x						2-methoxy-3,5,6-trichlorophenyl-acetic acid, Table 17
		x		x	x	x	x	x	x		x		x		x	x	x		x	x	x	x		x	x	trichloro-2,4-dimethylphenyl-acetic acid, Table 18
x	x															x	x		x							2-chloro-4,6-bis(ethylamino)-s-triazine [simazine], Table 19
x	x															x	x		x							2-chloro-4-ethylamino-6-iso-propylamino-s-triazine [atrazine], Table 20
x	x			x								x	x			x	x		x							2-methylthio-4,6-bis(3-methoxy-propylamino)-s-triazine, Table 21
x	x	x			x					x					x											isopropyl N-(3-chlorophenyl)-carbamate [CIPC], Table 22
x	x	x		x	x	x	x	x	x	x		x	x	x	x						x	x	x	x	x	ethyl N,N-di-n-propylthiolcar-bamate [EPTC], Table 23
	x	x		x	x	x	x	x	x	x		x	x	x	x	x	x		x		x	x	x	x	x	2-chloroallyl dipropyldithiocar-bamate, Table 24
x	x																		x							3-(3,4-dichlorophenyl)-1,1-di-methylurea [diuron], Table 25
x	x		x	x	x	x	x	x		x		x	x	x	x		x	x								2,3,5,6-tetrachlorotereph-thalic acid, dimethyl ester, Table 26
x	x	x		x	x	x	x	x		x		x	x	x	x	x	x	x	x						x	O-(2,4-dichlorophenyl) O-methyl isopropylphosphoramidothioate, Table 27
x	x				x					x						x	x									4,6-dinitro-o-sec-butylphenol [DNBP], alkanolamine salts, Table 32
x	x			x																						2,4-dichlorophenoxyacetic acid [2,4-D], alkanolamine salts, Table 33

Table 36. A brief generalized summary of preliminary post-emergence data by crop and chemical for easy reference for selection of chemicals for specific crops. 1/

	Chemical	3-amino-2,5-dichlorobenzoic acid [amiben], Table 1	3-nitro-2,5-dichlorobenzoic acid, Table 2	2-amino-3,5-dichlorobenzoic acid, Table 3	2-methyl-3,6-dichlorobenzoic acid, dimethylamine salt, Table 4	2,3,6-trichlorobenzaldehyde, Table 5	2,3,6-trichlorobenzoic acid [2,3,6-TBA], nickel salt, Table 6	2,3,6-trichlorobenzoic acid [2,3,6-TBA], sodium salt, Table 7	5-amino-2,3,6-trichlorobenzoic acid, Table 8	5-nitro-2,3,6-trichlorobenzoic acid, dimethylamine salt, Table 9	2-methoxy-3-methyl-5,6-dichloro-benzoic acid, Table 10	polychlorobenzoic acid [PBA], Table 11	polychlorobenzoic acid [PBA], sodium salt, Table 12	polychlorobenzoic acid [PBA], iso-octyl ester, Table 13	3,4-dichloro-α-methoxyphenyl-acetic acid, sodium salt, Table 14	2,3,6-trichlorophenylacetic acid [fenac], nickel salt, Table 15	2,3,6-trichlorophenylacetic acid [fenac], sodium salt, Table 16	2-methoxy-3,5,6-trichlorophenyl-acetic acid, Table 17	trichloro-2,4-dimethylphenyl-acetic acid, Table 18
	Crops																		
Small Seeded Legume Crops	Alfalfa		X																
	B-ft. trefoil														X				
	Lespedeza																		
	Red clover																		
	White clover	X																	
Cereals and Forage Crops	Buckwheat												X						
	Corn	X	X						X			X	X				X		
	Oats		X		X	X						X	X		X		X		
	Sorghum	X	X									X	X		X	X	X		
	Sudangrass	X	X									X	X		X				
Oilseed and Fiber Crops	Castorbeans																		
	Cotton																		
	Flax	X	X														X		
	Peanuts		X																
	Safflower		X																
	Soybeans																		
Root Crops	Sugar beets																		
Vegetable Crops	Cabbage	X										X	X						
	Cowpeas																		
	Cucumber											X							
	Lima beans		X									X					X		
	Peas	X																	
	Snapbeans																		
	Squash																		
	Weeds																		
	Grasses						X	X											
	Broadleaf	X			X	X	X	X	X	X	X	X	X		X	X	X		

1/ Checks are placed opposite crops that tolerated respective chemicals (Phytotoxicity index, 30 or less). Checks are placed opposite weeds controlled by respective chemicals (Phytotoxicity index, 70 or more).

Table 36. Continued.

Weeds: Broadleaf	Weeds: Grasses	Vegetable Crops: Squash	Vegetable Crops: Snapbeans	Vegetable Crops: Peas	Vegetable Crops: Lima beans	Vegetable Crops: Cucumber	Vegetable Crops: Cowpeas	Vegetable Crops: Cabbage	Root Crops: Sugar beets	Oilseed and Fiber Crops: Soybeans	Oilseed and Fiber Crops: Safflower	Oilseed and Fiber Crops: Peanuts	Oilseed and Fiber Crops: Flax	Oilseed and Fiber Crops: Cotton	Oilseed and Fiber Crops: Castorbeans	Cereals and Forage Crops: Sudangrass	Cereals and Forage Crops: Sorghum	Cereals and Forage Crops: Oats	Cereals and Forage Crops: Corn	Cereals and Forage Crops: Buckwheat	Small Seeded Legume Crops: White clover	Small Seeded Legume Crops: Red clover	Small Seeded Legume Crops: Lespedeza	Small Seeded Legume Crops: B-ft. trefoil	Small Seeded Legume Crops: Alfalfa	Chemical
x																x	x	x	x							2-chloro-4,6-bis(ethylamino)-s-triazine [simazine], Table 19
x	x												x			x	x			x						2-chloro-4-ethylamino-6-isopropylamino-s-triazine [atrazine] Table 20
x	x												x													2-methylthio-4,6-bis(3-methoxypropylamino)-s-triazine, Table 21
x		x		x	x				x	x					x	x	x	x	x	x			x	x	x	isopropyl N-(3-chlorophenyl)-carbamate [CIPC], Table 22
		x	x									x	x	x		x	x	x	x	x	x	x	x	x	x	ethyl N,N-di-n-propylthiolcarbamate [EPTC], Table 23
		x	x	x	x		x	x				x	x	x	x	x	x	x	x	x	x	x	x	x	x	2-chloroallyl dipropyldithiocarbamate, Table 24
x	x																									3-(3,4-dichlorophenyl)-1,1-dimethylurea [diuron], Table 25
		x	x	x				x				x	x	x		x	x	x	x		x	x	x	x	x	2,3,5,6-tetrachloroterephthalic acid, dimethyl ester, Table 26
x	x															x		x			x	x		x	x	O-(2,4-dichlorophenyl) O-methyl isopropylphosphoramidothioate, Table 27
x	x			x				x				x	x		x											trimethylsulfonium chloride, Table 28
x		x						x	x			x	x	x		x	x	x	x	x		x		x	x	2-dimethylamino-1,4-naphthoquinone, Table 29
x		x		x				x	x		x	x	x	x	x	x	x	x	x	x						2-N-propylamino-1,4-naphthoquinone, Table 29
x		x			x	x		x			x	x	x	x		x	x	x	x	x			x		x	2-isopropylamino-1,4-naphthoquinone, Table 29
																										crude amine residues, Table 30
																										2-methyl imidazole, Table 31
x	x		x									x					x	x		x	x	x	x	x	x	4,6-dinitro-o-sec-butylphenol [DNBP], alkanolamine salts, Table 32
x												x				x	x	x	x							2,4-dichlorophenoxyacetic acid [2,4-D], alkanolamine salts, Table 33

Table 37. A comparison of pre-emergence and post-emergence spray and granular herbicide applications.

Chemical	2,3,6-trichlorobenzoic acid [2,3,6-TBA], sodium salt				2,3,6-trichlorophenylacetic acid [fenac]				2-chloro-4,6-bis(ethylamino)-s-triazine [simazine]				2-chloro-4-ethylamino-6-iso-propylamino-s-triazine [atrazine]			
Treatment and Rate	Pre-e		Post-e		Pre-e		Post-e		Pre-e		Post-e		Pre-e		Post-e	
	4W	4G	4W	4G	4W	4G	4W	4G	8W	8G	8W	8G	8W	8G	8W	8G
Crops */																
Alfalfa	100	100	90	95	100	100	90	60	100	100	90	90	100	100	100	100
B-ft. trefoil	90	90	100	90	100	100	100	70	100	100	80	90	100	100	100	60
Lespedeza	100	100	100	100	100	100	100	100	100	100	95	95	100	100	100	40
Red clover	100	100	100	100	100	100	95	60	100	100	95	100	100	100	100	90
White clover	100	100	100	80	100	100	90	50	100	100	100	100	100	100	100	90
Buckwheat	60	60	95	70	80	60	80	50	100	100	100	100	100	100	100	60
Corn	30	40	90	50	80	60	50	40	10	10	0	0	10	10	10	0
Oats	40	50	80	50	60	40	40	30	60	80	40	60	100	100	95	80
Sorghum	70	50	60	40	80	70	50	60	30	20	0	0	30	20	30	0
Sudangrass	90	80	60	40	80	70	60	60	30	20	30	0	30	35	30	0
Castorbeans	100	90	100	70	80	80	95	40	100	100	100	100	100	100	100	100
Cotton	100	90	100	70	100	100	100	90	95	90	90	90	100	100	100	70
Flax	95	95	100	80	80	90	100	20	100	100	60	60	100	100	100	20
Peanuts	100	100	95	95	95	95	80	70	95	90	95	100	100	100	100	50
Safflower	95	95	100	80	95	100	80	40	100	100	100	95	100	100	100	40
Soybeans	100	100	100	100	95	95	95	40	100	95	100	95	100	100	100	50
Sugar beets	100	100	95	90	100	100	80	60	100	100	100	100	100	100	100	80
Cabbage	90	60	90	60	100	100	50	50	100	100	100	100	100	100	100	80
Cowpeas	100	95	100	80	95	95	95	60	100	100	100	95	100	100	100	90
Cucumber	100	100	100	90	100	100	95	60	100	100	100	100	100	100	100	100
Lima beans	100	90	100	40	95	80	70	20	100	100	90	80	100	100	100	40
Peas	70	60	100	100	70	70	100	100	70	70	95	95	100	100	100	60
Snapbeans	95	95	100	90	95	95	95	60	100	100	95	100	100	100	100	40
Squash	95	90	95	70	95	95	80	60	100	100	100	100	100	100	100	90
Weeds																
Crabgrass	90	90	10	0	95	80	20	10	100	100	20	30	100	100	90	10
Ryegrass	20	20	10	0	80	80	30	30	90	90	40	60	100	100	100	30
Lambsquarters	100	100	95	20	100	100	70	30	100	100	100	95	100	100	100	50
Mustard	90	70	95	70	100	95	90	10	100	100	95	95	100	100	100	50
Pigweed	100	100	95	20	100	100	60	50	100	100	100	100	100	100	100	50

*/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 37. Continued

Chemical	isopropyl N-(3-chlorophenyl)-carbamate [CIPC]				ethyl N,N-di-n-propylthiolcarbamate [EPTC]				4,6-dinitro-o-sec-butylphenol [DNBP], alkanolamine salts				2,4-dichlorophenoxyacetic acid [2,4-D], alkanolamine salts			
Treatment and Rate	Pre-e		Post-e		Pre-e		Post-e		Pre-e		Post-e		Pre-e		Post-e	
	8W	8G	8W	8G	8W	8G	8W	8G	8W	8G	8W	8G	4W	4G	4W	4G
Crops	*/															
Alfalfa	80	80	40	10	50	60	20	20	100	95	80	10	100	100	100	70
B-ft. trefoil	100	95	40	50	30	20	30	20	95	90	95	30	100	100	100	50
Lespedeza	95	95	90	80	30	30	0	0	90	60	95	30	95	95	100	80
Red clover	100	95	60	50	40	30	30	20	95	90	95	30	100	100	100	80
White clover	90	80	70	40	40	30	30	20	95	90	90	30	100	100	100	70
Buckwheat	100	100	70	50	80	100	30	10	100	100	100	30	70	80	100	60
Corn	60	70	40	20	50	50	30	20	50	70	95	40	60	90	70	10
Oats	70	70	70	20	80	60	20	10	70	70	80	20	90	90	30	10
Sorghum	70	70	30	30	90	70	10	0	50	60	90	30	100	95	40	10
Sudangrass	70	70	40	20	90	70	30	10	50	60	80	40	100	95	50	20
Castorbeans	40	50	70	60	30	30	95	70	40	50	100	100	90	90	100	100
Cotton	80	70	95	80	60	80	90	95	50	70	100	80	90	90	100	95
Flax	100	100	80	70	20	20	40	30	95	90	95	40	80	50	95	40
Peanuts	70	70	80	40	70	80	0	0	80	70	30	20	90	90	70	10
Safflower	20	10	70	40	40	30	20	10	100	100	100	95	100	100	100	90
Soybeans	60	70	70	30	30	40	70	50	50	70	95	40	70	60	100	90
Sugar beets	80	80	50	40	20	20	60	40	100	100	100	95	100	100	100	95
Cabbage	95	90	70	40	30	40	95	50	100	100	100	100	100	100	100	70
Cowpeas	50	60	70	40	50	60	80	60	50	40	100	60	95	90	100	95
Cucumber	100	100	90	80	70	70	70	50	90	90	100	90	90	100	100	40
Lima beans	70	90	80	30	60	50	50	40	70	40	90	50	90	95	100	40
Peas	50	50	60	60	40	30	60	40	70	50	95	60	60	30	100	80
Snapbeans	80	90	90	60	40	40	30	30	70	70	95	30	70	70	100	80
Squash	70	60	50	20	30	20	30	10	80	80	95	50	95	90	95	50
Weeds																
Crabgrass	90	80	50	30	90	90	20	10	95	80	95	40	80	90	10	0
Ryegrass	95	95	70	70	95	95	30	60	90	80	90	30	40	70	10	10
Lambsquarters	90	80	70	40	60	70	0	0	100	95	100	40	95	90	100	90
Mustard	100	100	90	40	10	20	10	0	100	100	100	90	100	100	100	80
Pigweed	90	80	70	40	70	60	0	0	100	90	100	40	100	100	100	90

*/ Herbicide activity index: 0 = no effect; 100 = complete kill.

Table 38. Logarithmic Rate Plot Results, Tables 38-42.

Chemical	3-amino-2,5-dichlorobenzoic acid [amiben]					2-methoxy-3,5-dibromobenzoic acid				
Rate Range lb/A	2.0 to 8.0					1.0 to 4.0				
Application	Pre-pl			Pre-e	Post-e	Pre-pl			Pre-e	Post-e
Interval between treatment and planting - days	7	14	28			7	14	28		
Crops										
Cabbage	0.0*	0.0	2.0	0.0	4.0	0.0	4.0	4.0	0.0	4.0
Corn	3.0	4.0	8.0	0.0	5.0	4.0	4.0	4.0	4.0	2.0
Cotton	0.0	2.0	2.0	0.0	0.0	4.0	4.0	4.0	0.0	0.0
Peanuts				0.0	4.0				4.0	4.0
Soybeans	0.0	8.0	8.0	8.0	6.0	4.0	4.0	4.0	0.0	0.0
Sugar beets				0.0	0.0				0.0	4.0
Weeds										
Grasses	2.0	2.0	nc**	nc	nc	nc	nc	nc	nc	nc
Broadleaved	2.0	2.0	nc	2.0	nc	nc	nc	nc	nc	nc

Chemical	2,3,6-trichlorobenzoic acid [2,3,6-TBA], sodium salt					2-methoxy-3,6-dichlorobenzoic acid				
Rate Range lb/A	1.0 to 4.0					1.0 to 4.0				
Application	Pre-pl			Pre-e	Post-e	Pre-pl			Pre-e	Post-e
Interval between treatment and planting - days	7	14	28			7	14	28		
Crops										
Cabbage	0.0*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Corn	2.0	2.0	2.0	2.0	0.0	4.0	4.0	4.0	0.0	2.0
Cotton	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peanuts				0.0	2.0				0.0	0.0
Soybeans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sugar beets				0.0	0.0				0.0	0.0
Weeds										
Grasses	nc**	nc	nc	nc	nc	nc	nc	nc	nc	nc
Broadleaved	2.0	2.0	2.0	1.0	nc	nc	nc	nc	1.0	2.0

* 0 = no crop tolerance in rate range indicated.
** nc = no weed control in rate range indicated.

Table 39.

Chemical	2-methoxy-3-methyl-6-chloro-benzoic acid					2,6-dimethoxy-3,5-dichloro-benzoic acid				
Rate Range lb/A	1.0 to 4.0					1.0 to 4.0				
Application	Pre-pl			Pre-e	Post-e	Pre-pl			Pre-e	Post-e
Interval between treatment and planting - days	7	14	28			7	14	28		
Crops										
Cabbage	0.0*	0.0	0.0	0.0	4.0	0.0	0.0	2.0	0.0	0.0
Corn	2.0	0.0	0.0	0.0	6.0	2.0	3.0	4.0	2.0	0.0
Cotton	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0	2.0	0.0
Peanuts				0.0	0.0				2.0	0.0
Soybeans	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0
Sugar beets				0.0	0.0				0.0	0.0
Weeds										
Grasses	nc**	nc	nc	nc	nc	nc	nc	nc	nc	nc
Broadleaved	nc	nc	nc	2.0	4.0	nc	nc	nc	nc	nc

Chemical	2-methoxy-3,5,6-trichloro-benzoic acid					2-methoxy-3,6-dichloro-5-nitrobenzoic acid				
Rate Range lb/A	1.0 to 4.0					1.0 to 4.0				
Application	Pre-pl			Pre-e	Post-e	Pre-pl			Pre-e	Post-e
Interval between treatment and planting - days	7	14	28			7	14	28		
Crops										
Cabbage	0.0*	4.0	4.0	4.0	0.0	4.0	4.0	4.0	4.0	0.0
Corn	4.0	4.0	4.0	4.0	0.0	4.0	4.0	4.0	4.0	2.0
Cotton	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0
Peanuts				0.0	0.0				4.0	0.0
Soybeans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sugar beets				0.0	0.0				0.0	0.0
Weeds										
Grasses	nc**	nc	nc	nc	nc	nc	nc	nc	nc	nc
Broadleaved	nc	nc	nc	nc	4.0	nc	nc	nc	1.0	nc

* 0 = no crop tolerance in rate range indicated.
** nc = no weed control in rate range indicated.

Table 40.

Chemical	2,3,6-trichlorophenylacetic acid [fenac], sodium salt					2-methoxy-3,6-dichlorophenyl-acetic acid				
Rate Range lb/A	1.0 to 4.0					1.0 to 4.0				
Application	Pre-pl			Pre-e	Post-e	Pre-pl			Pre-e	Post-e
Interval between treatment and planting - days	7	14	28			7	14	28		
Crops										
Cabbage	0.0*	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	3.0
Corn	2.0	0.0	2.0	0.0	1.0	2.0	0.0	3.0	0.0	2.0
Cotton	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peanuts				0.0	0.0				0.0	0.0
Soybeans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sugar beets				0.0	2.0				0.0	0.0
Weeds										
Grasses	1.0	1.0	1.0	1.0	nc**	nc	2.0	nc	nc	nc
Broadleaved	1.0	1.0	1.0	1.0	nc	nc	3.0	nc	1.0	nc

Chemical	2-chloro-4,6-bis(ethylamino) -s-triazine [simazine]					2-methoxy-4,6-bis(3-methoxy-propylamino)-s-triazine				
Rate Range lb/A	2.0 to 8.0					2.0 to 8.0				
Application	Pre-pl			Pre-e	Post-e	Pre-pl			Pre-e	Post-e
Interval between treatment and planting - days	7	14	28			7	14	28		
Crops										
Cabbage	0.0*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Corn	8.0	8.0	8.0	6.0	8.0	2.0	4.0	4.0	8.0	0.0
Cotton	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	8.0	0.0
Peanuts				0.0	0.0				8.0	0.0
Soybeans	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	4.0	0.0
Sugar beets				0.0	0.0				0.0	0.0
Weeds										
Grasses	2.0	2.0	2.0	2.0	nc**	nc	4.0	8.0	2.0	nc
Broadleaved	2.0	2.0	2.0	2.0	4.0	4.0	4.0	6.0	2.0	2.0

* 0 = no crop tolerance in rate range indicated.
** nc = no weed control in rate range indicated.

Table 41.

Chemical	2,6-dichlorobenzonitrile					N-(3,4-dichlorophenyl)-2-methyl-2-pentenamide				
Rate Range lb/A	0.25 to 1.0					1.0 to 4.0				
Application	Pre-pl			Pre-e	Post-e	Pre-pl			Pre-e	Post-e
Interval between treatment and planting - days	7	14	28			7	14	28		
Crops										
Cabbage	0.0*	0.0	0.0	0.0	1.0	0.0	2.0	2.0	2.0	0.0
Corn	1.0	1.0	1.0	1.0	1.0	2.0	4.0	4.0	2.0	0.0
Cotton	0.0	0.0	0.0	0.0	1.0	4.0	4.0	4.0	4.0	0.0
Peanuts				1.0	1.0				4.0	0.0
Soybeans	0.0	0.0	0.0	0.0	0.0	0.0	4.0	4.0	4.0	0.0
Sugar beets				0.0	1.0				2.0	0.0
Weeds										
Grasses	nc**	nc	nc	nc	nc	nc	nc	nc	nc	nc
Broadleaved	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc

Chemical	N-(3,4-dichlorophenyl)-2-methylpropanamide					N-(3,4-dichlorophenyl)-methacrylamide				
Rate Range lb/A	1.0 to 4.0					1.0 to 4.0				
Application	Pre-pl			Pre-e	Post-e	Pre-pl			Pre-e	Post-e
Interval between treatment and planting - days	7	14	28			7	14	28		
Crops										
Cabbage	4.0	4.0	4.0	4.0	0.0*	4.0	4.0	4.0	4.0	0.0
Corn	2.0	4.0	4.0	4.0	0.0	4.0	4.0	4.0	4.0	0.0
Cotton	1.0	2.0	4.0	4.0	0.0	4.0	4.0	4.0	4.0	0.0
Peanuts				4.0	0.0				4.0	0.0
Soybeans	0.0	4.0	4.0	4.0	0.0	4.0	4.0	4.0	4.0	0.0
Sugar beets				4.0	0.0				4.0	0.0
Weeds										
Grasses	3.0	nc**	nc	nc	nc	nc	nc	nc	nc	nc
Broadleaved	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc

* 0 = no crop tolerance in rate range indicated.
** nc = no weed control in rate range indicated.

Table 42.

Chemical	4,6-dinitro-o-sec-butylphenol [DNBP], alkanolamine salts					isopropyl N-(3-chlorophenyl)-carbamate [CIPC]				
Rate Range lb/A	2.0 to 8.0					2.0 to 8.0				
Application	Pre-pl			Pre-e	Post-e	Pre-pl			Pre-e	Post-e
Interval between treatment and planting - days	7	14	28			7	14	28		
Crops										
Cabbage	2.0	2.0	2.0	0.0*	0.0	0.0	4.0	8.0	0.0	0.0
Corn	8.0	8.0	8.0	8.0	0.0	4.0	4.0	8.0	6.0	0.0
Cotton	4.0	8.0	8.0	4.0	0.0	4.0	8.0	8.0	8.0	0.0
Peanuts				8.0	5.0				6.0	0.0
Soybeans	4.0	8.0	8.0	4.0	0.0	4.0	8.0	8.0	0.0	0.0
Sugar beets				0.0	0.0				0.0	0.0
Weeds										
Grasses	nc**	nc	nc	nc	nc	nc	nc	nc	2.0	nc
Broadleaved	nc	nc	nc	2.0	3.0	nc	nc	nc	2.0	nc

* 0 = no crop tolerance in rate range indicated.
** nc = no weed control in rate range indicated.